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THE DIFFERENTIAL DIAGNOSIS OF CUSHING'S SYNDROME (BASOPHILISM) OF PITUITARY OR ADRENAL ORIGIN

BY

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The clinical syndrome described by Cushing in 1932, and which bears his name, was assigned by him to basophil adenomas of the pituitary body (basophilism). In the same year attention was drawn (Broster, Gardiner-Hill, and Greenfield, 1932) to a similar clinical condition in association with bilateral hyperplasia of the adrenal glands. Some three years ago my interest in the subject was further stimulated by a visit to the late Dr. Harvey Cushing at Yale University, where I had the privilege of discussing the subject and examining some of the original sections of these basophil adenomas. Cushing in his article had mentioned that the adrenal glands in his series of cases were either normal or hyperplastic.

Essentially the syndrome is characterized by two changes—disturbances in the sex mechanism and disturbances of metabolism. The typical picture is that of a young woman who acquires hirsuties of the male type, experiences irregularities or cessation of the menstrual function, and becomes abnormally and permanently fat. In the male there is a similar increase in weight, a diminution in the size of the external genitalia, and a loss of sex function. Accompanying these changes are more variable secondary symptoms, such as a low sugar tolerance with or without glycosuria, a raised blood pressure, erythrocythaemia, and cholesterolaemia, and the skin is coarse and marked by striae distensiae, most commonly in the flanks. Broster, Gardiner-Hill, and Greenfield (1932) drew attention to a case:

"in which the adrenal lesion appears to be only one element in a pluriglandular syndrome. This patient presents the symptom complex described by Achard and Thiers (1921) as 'diabetes of a bearded woman,' a condition associated with adrenal hyperplasia and changes in other ductless glands—namely, ovarian sclerosis and atrophy, celloid hypersecretion of the thyroid, cirrhosis of the liver, and pericanalicular sclerosis of the pancreas with increase in the islands of Langerhans, the pituitary being normal. The chief symptoms were hypertrichosis of the face of the masculine type, without other signs of virilism, the breasts and external genitalia being normal, obesity, glycosuria with decreased carbohydrate tolerance, hypertension, and usually amenorrhoea or irregular menstruation. These authors were of the opinion that the adrenal glands played an important part in the aetiology of this condition, but were probably not primary. Our case appeared to be a typical example of this syndrome in a young girl."

The results of unilateral adrenalectomy in this patient proved disappointing, for I reported some years later that, although there was some improvement in the hirsuties, the hypertension, menstruation, and carbohydrate tolerance remained much the same. Dr. Gardiner-Hill was of the opinion later that this case might well have been one of Cushing's syndrome. However, it was interesting that the adrenal factor was only proved subsequently when Vines had definitely established his ponceau-fuchsin stain in relation to adrenal virilism (Broster and Vines, 1933), for the specimen of the gland had been kept, and the adrenocortical cells gave a positive fuchsinophil reaction.

Comparison of Cushing's Syndrome with the Adreno-Genital Syndrome

In order to obtain some insight into the adreno-pituitary mechanism a comparison of Cushing's pituitary syndrome with the adreno-genital syndrome in its purest form (adrenal virilism) would not be out of place.

First there is a marked similarity in the mode of onset. In both there occurs in a young woman after puberty an irregular growth of hair of the male type and irregular menstruation. There seems to be no absolute rule in the sequences of these two main symptoms. The growth of hair may first appear or the change in the menstrual cycle, but sooner or later the two occur together during what seems to be a phase of definite endocrine instability, and then comes the parting of the ways. In Cushing's syndrome there develops a rapid and marked increase in adiposity, which becomes permanent and pathological, followed by the secondary symptoms already referred to. In adrenal virilism the weight usually remains stationary, but in some there is a definite increase, which is either transitory or not excessive. None of the secondary symptoms of Cushing's syndrome appear, and instead of fat the patient develops muscle and secondary male characters, which are the essential features of virilism.

However, between these two extremes there exists quite a large clinical group of hefty hairy women who cannot be labelled Cushing's syndrome on the one hand or virilism on the other.

Laboratory Investigations

Although clinical symptoms are valuable in suggesting new avenues for investigation, it is difficult to assess their relative significance, especially in a mixed syndrome, unless backed by special laboratory tests. Fortunately, in the pure adrenal syndrome recent advances have established standards of comparison by both histological and

biochemical means. The ponceau-fuchsin stain of Vines has been already referred to; not only does it confirm the diagnosis of virilism, but there is now evidence that the colour intensity whereby the cortical cells absorb the vivid red fuchsin dye bears some relation to the clinical degree of virilism (Broster, 1939). The biochemical experiments of Patterson and Greenwood (Broster *et al.*, 1938) have for some time shown an excess of an androgenic substance in the urine of these patients. These observations were originally established by the capon test, and later have been corroborated by the "colour test"—that is, the colorimetric determination of keto-steroids. Furthermore, reference might also be made to the substances found by Marrian and Butler (Broster *et al.*, 1938) in the urine of these patients with adrenal virilism, and not found in normal individuals—namely, pregnane-triol and, accompanying other keto-steroids, iso-androsterone. The amounts of keto-steroids, their androgenic moiety, and also pregnane-triol are all reduced in the urine after unilateral adrenalectomy. From this it will be seen that we now possess methods of determining adreno-cortical function, of which at least two are practicable in their application to clinical cases.

Basophilism of the Adrenal Type

Recently there have been recorded several cases clinically indistinguishable from Cushing's syndrome, due to adrenal cortical carcinoma, notably by Kepler, Walters, and Piper (1938) in America, and in this country by Hare, Ross, and Crooke (1935) and by Lescher and Robb-Smith (1935). In both the latter cases no pituitary adenoma was present, but the adrenal tumour cells gave the positive fuchsin staining reaction. In the case presented by Hare, Ross, and Crooke the basophil cells of the pituitary were within normal limits, but the urine contained a marked excess of androgens. Crooke and Callow (1939) published a series of four cases of Cushing's syndrome, two due to basophil adenoma of the pituitary and two due to adrenal cortical carcinoma. The latter gave high values in the amount of urinary androgens both by the capon and colour tests, whereas the former gave low values. Those authors suggest that the determination of androgens in the urine gives valuable assistance in diagnosing the presence of cortical tumours in cases of basophilism. However, they do not state in all their cases whether the adrenal glands give a positive fuchsin reaction or not. This is an important point to decide, and Vines (Broster *et al.*, 1938) in a small series of nine cases of proven basophil adenoma at Charing Cross Hospital found that in three males it was negative and that of six females it was positive in four and negative in two. Crooke in 1936 made the important observation that in cases of basophilism, whether of adrenal origin or not, hyaline change in the basophil cells of the pituitary is always found. It therefore appears that in basophilism this hyaline change is a *sine qua non*, whereas the fuchsin stain in the adreno-cortical cells may or may not be present. The two cases recorded here confirm the work of Crooke and Callow, and the role of the adrenal in basophilism has been advanced a stage further—from malignant tumour to simple hyperplasia.

Case 1

Basophilism due to Adenoma of the Pituitary by Exclusion, with Low Urinary Androgen

A man aged 21 complained on August 30, 1939, of a rapid increase of weight, sex changes, and increasing lassitude and weakness. He is the middle son of a family of three boys, and is a milkman by trade. His previous history is normal, except that he was a premature child (one month) and was delivered by forceps owing to ante-partum haemorrhage. His grandfather was a stout man and his mother was stout until the age of 18.

He was perfectly well until fifteen months previously, when his attention was drawn to the fact that his face and neck were increasing in size and that he was putting on weight generally. Recently he has complained of headache across his brow and later of pain in the small of the back. His voice cracked normally after puberty. During the last year the hair on his head began to fall out excessively, and within the last six months he noticed a diminution in the size of his genitalia, with a loss of erectile power. His genitalia are now about half their normal size, and he is acutely sensitive of his condition. Three months ago his legs began to swell, and he noticed that although his fluid intake was normal the output was greater, especially at night. His adiposity continues to increase, chiefly on the abdomen, face, neck, and trunk. He was forced to discontinue pushing his hand-cart, owing to weakness of his legs, and he now finds difficulty in climbing stairs.

FIG. 1.—Patient at age of 17.

FIG. 2.—At age of 19.

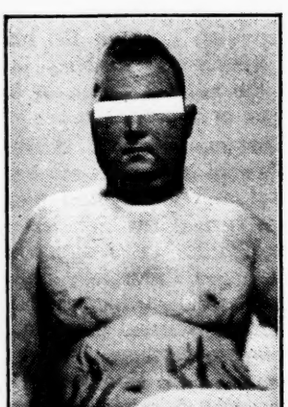

FIG. 3.—At age of 21.

The patient has a gross obesity of the buffalo type, confined to the face, neck, abdomen, and breasts. The limbs are relatively thin except for the oedema of his legs. Comparative photographs (Figs. 1, 2, 3) show that an increase in weight started at the age of 17, but it was not until the age of 20 that it suddenly became more marked. He weighs 13 st. 10 lb., and put on 3½ inches round the chest in three months. His face is moon-shaped and full, with the ruddy glow of a setting sun. This coloration is reflected in enormously enlarged vividly red striae atrophicae which cover his flanks, axillae, and thighs, and suggests that this condition is not due to a mere stretching of the skin. His general appearance is one of sluggish lethargy.

INVESTIGATIONS

The blood pressure was raised, and varied between 155/105 and 180/120 mm. Hg. The blood urea was 29 mg. per 100 c.cm. The urine showed a faint trace of albumin and reducing substance. In the blood count there were 4,620,000 red cells per c.mm., with 88 per cent. haemoglobin and a colour index of 0.95. A radiograph of the skull showed a small pituitary fossa and doubtful erosion of the posterior clinoids. Sugar tolerance was low (see Graph). The clinical diagnosis rested between a basophil adenoma of the pituitary and an adreno-cortical carcinoma.

Owing to the suspension in the work of the Wakefield Trust at Charing Cross Hospital due to the war, facilities for performing the male hormone test were not available when the patient was admitted to hospital on October 15. The pain in the back had increased, and a radiograph of the spine showed

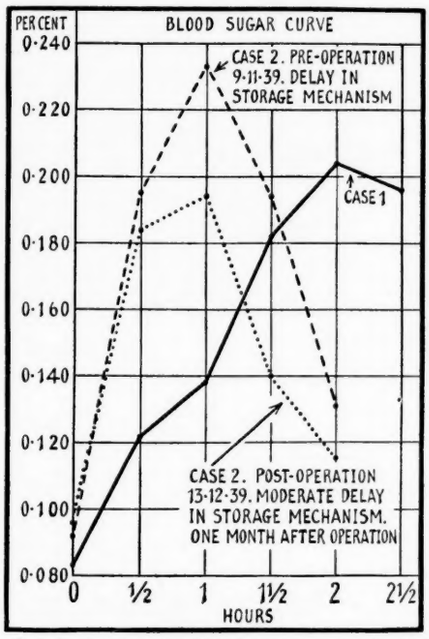

FIG. 4.—Graph showing the blood-sugar curves in Case I and Case II.

rarefaction in the body of the fifth lumbar vertebra. This information suggested the possibility of a secondary deposit to an adrenal carcinoma. A perirenal air insufflation was performed, but in a person so fat this did not give any material help beyond showing some irregularity of the left kidney. An exploratory laparotomy was then decided upon, which confirmed the absence of adrenal tumour. At a later date, through the kindness of Dr. Payne of Great Ormond Street Hospital, a colour test was performed, and he reported a trace of sterone present in a twenty-four-hour collection of urine.

The patient was then given a course of deep *x*-ray therapy to his pituitary gland at Charing Cross Hospital. The pain in the back continued to be distressing, and he was seen by Drs. Gordon Holmes and Hamilton, on whose suggestion investigation of the blood calcium was performed. This gave the low figure of 7.9 mg. per 100 c.cm. as against the normal of 9 to 11 mg., suggesting a dysfunction of the parathyroid glands. Four months afterwards there was no improvement: the patient is practically bedridden, and the mother reported that his chest seems to be "bending in," suggesting a further softening of the skeletal structures. I am not aware of any experimental work conclusively establishing the existence of a parathyrotrophic hormone, but I have observed clinically bony hypertrophy and bony overgrowth in association with adrenal tumour and adrenal hyperplasia, and premature ossification in cases of adrenal precocity. It is interesting that this case of pituitary adenoma should reveal such marked secondary changes in other ductless glands.

Case II

Basophilism due to Adrenal Hyperplasia with High Urinary Androgens, lowered by Operation, and a Positive Ponceau-fuchsin Stain

A single woman aged 28 complained of an abnormal growth of hair, irregular menses, and obesity. Her own history and her family history are of no importance. Hair is not a conspicuous feature in her case. At the age of 21 it began to grow under her chin, and, later, on the upper lip and cheeks. There is a slight growth on the chest, the lumbar and suprapubic region, and on the limbs.

Her periods, which started at the age of 12, were normal until she was 14, when they became grossly irregular and painful. At different times there has been amenorrhoea varying from six weeks to eleven months. The period lasts from one to three days, with little loss. Although on the plump side she began to put on weight excessively after the hirsuties appeared, gaining five stone in the last few years, and she is now 15 st. 9 lb. She has also complained of frontal

FIG. 5.

headaches during the last three years, which become worse after she has been to the pictures. Recently she has had pain under the left subcostal margin at intervals. The patient is a stout brown-eyed brunette, fat being confined to the face, neck, breasts, and trunk. Her complexion is ruddy, and the skin round the areola of the breasts is reddish. There are striae distensiae in both flanks.

INVESTIGATIONS

The patient's blood pressure was 120/80, the blood urea was 29 mg. per 100 c.cm., and her blood group O. The sella turcica is small and rounded, and the mandible and axillae are well developed. The uroselectan radiograph was normal, but there is a suspicion of a shadow above the left kidney. The urine was normal and the sugar tolerance low, and the pre-operative readings are shown with the post-operative in the accompanying graph. In the out-patient department a diagnosis of Cushing's syndrome was made, but it was decided in the course of routine to have an estimation of her urinary androgens performed, and in two samples taken at a week's interval in May, 1939, Dr. Patterson reported 33.4 and 28.6 mg. of sterone daily on the colour test, a value three times above the average normal in ordinary cases of virilism. On this account she was admitted as an in-patient on July 8 and artificial perirenal insufflation was performed by Mr. Sawyer. A skiagram showed a clear-cut outline of the left kidney surrounded by gas, and above this a circumscribed shadow the size of a golf ball, separate and removed from the shadow of the spleen. A lateral view revealed the same shadow distinctly above and in front of the kidney. In consultation with Dr. Shanks a diagnosis of adrenal tumour was made.

Owing to the war it was not possible to explore this patient until November, 1939. No tumour was found, but the left

adrenal was enlarged and hyperplastic to about three times its normal size, weighing 16 grammes, and Dr. Vines reported that it gave a fairly strong fuchsinophil reaction. Left unilateral adrenalectomy was therefore performed. It was obvious from the skiagram that the "tumour" we suspected was the spleen, although it is difficult to say why it appeared to be surrounded by air. Apart from an unexplained attack of pyelitis about the fourteenth day the patient made an uninterrupted recovery.

The post-operative assay for male hormone taken on December 13 showed that the amount of sterone was reduced to 6.5 mg. daily, a figure which may be regarded as a low normal. The sugar tolerance shows a decrease, and is charted with the pre-operative result. Within two months the patient had lost a stone and a half in weight, the blood pressure is the same, and her periods have been regular. The present photograph was taken in January, 1940; the pre-operative one was unfortunately lost.

This case of basophilism due to adrenal cortical hyperplasia presents several points of interest. A diagnosis was only arrived at by means of a urinary assay for androgens. The immediate response to unilateral adrenalectomy, both clinically and biochemically, and the corroboration of the diagnosis by histological means, conform to the experience which we have obtained in our work on virilism.

Summary

At the moment it may be said that the subject of basophilism is still *sub judice*. An apparently identical clinical syndrome may result from a lesion in either the pituitary or the adrenal glands. It is a matter of speculation whether the one is primary and the other secondary, or whether both are involved. From the practical standpoint in the treatment of a condition which has hitherto been unsatisfactory, and the study of these two cases, one of each type provides confirmation of the view that estimation of the urinary androgens affords a valuable means of making a differential diagnosis. When these are in excess it points to adreno-cortical overactivity. The ancillary methods of confirming such a diagnosis are discussed in the description of each of the two cases. The important outcome is that unilateral adrenalectomy in suitable cases offers a hope of alleviation, if not cure, in this most distressing condition.

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The printed newsletter which the Central Council for the Care of Cripples has published in the past has been discontinued for reasons of economy. It is being replaced by a quarterly stencilled newsletter, of which the first issue is dated January, 1940. Although the material in such a publication must necessarily be restricted and the circulation has had to be cut down, it is hoped to include in the new publication items of special interest to orthopaedic hospitals and institutions and to all workers for cripples. Those who are in a position to contribute such items may send them addressed to the Editor, News Bulletin, Central Council for the Care of Cripples, 34, Eccleston Square, S.W.1. The fifth International Exhibition of Cripples' Work, which was to have been held at the Seymour Hall, London, W.1, last October, has had to be indefinitely postponed owing to the war.

CARDIAC EXAMINATION IN WARTIME

BY

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The advantage in diagnosis of making the most of symptoms has been well appreciated by the profession in our time, and in no branch of medicine more than cardiology, thanks largely to the influence of Mackenzie. For instance, the diagnosis of angina pectoris can be, and often must be, made solely from what the patient tells us: the patient's story is the foundation of diagnosis. The recognition of slight heart disease in men of military age is to be approached by a very different method. Here physical signs come into their own and become the basis of diagnosis. Unfortunately the signs will often be slight or dubious, and difficult to interpret. A shaky sign is a poor foundation for a weighty diagnosis, though this may rest on a trusty sign supported by others less convincing. It may therefore be useful to recapitulate and examine these signs as they apply to the recognition of the early stage or minor grades of cardiac disease in recruits and soldiers.

The work of a medical examiner in wartime is difficult enough, and constant care will scarcely prevent the occasional acceptance of this type of cardiac subject. The difficulty will be mitigated by knowing that such cases will almost be limited to rheumatic and perhaps congenital heart disease. Even with proper care and reasonable skill, diagnosis may still remain a matter of probability—and yet a decision has to be taken.

The history cannot be neglected, for the candidate may know that his heart has been described as "weak" perhaps from his very early years, or later and maybe from an attack of rheumatism or of chorea. A history of tonsillitis has little value, and of scarlet fever or diphtheria almost none. He may also think or know that he is more short-winded than his fellows. Any such points in history will make the examiner more alert in his search for signs.

The appearance will only help if there happens to be cyanosis and clubbed fingers due to a cyanotic congenital lesion. The coloration of the cheeks is so varied in healthy men that suspicion of mitral disease should not easily be roused by a high colour.

The Pulse

Pulse-response tests (so-called exercise, tolerance tests) can have little value in the recognition of myocardial or valvular disease, or indeed in assessing myocardial efficiency; yet they are valuable in judging the nervous control of the heart rate. An examiner soon learns to overlook the natural tachycardia of nervousness, especially when it dwindles as the interview proceeds and during the recumbency which is essential to every cardiac examination. Where a high rate persists—for example, over 100—a thermometer may explain it, or the state of the throat or the lungs. Re-examination after an interval may be indicated if the rate persists well over 100 throughout the interview and after recumbency. A high grade of persistent tachycardia can be one expression of a neurosis, and judgment as to fitness may have to depend on the state of the nervous system more than that of the heart.

Hyperthyroidism is occasionally the cause of a high tachycardia which persists. For the detection of slight thyroid enlargement, the subject, sitting on a low chair, should lean forward and moderately elevate the chin. The observer, standing in front, asks him to swallow, when the gland will rise and reveal its size and form. If enlargement is doubtful, the lively temperament, the fine tremor of the fingers, and the wasting will tell in diagnosis.

The rhythm may show a waxing and waning of the rate with inspiration and expiration, especially if the pulse is infrequent, but this is normal sinus arrhythmia. Extrasystoles will disappear with the tachycardia of a trial exertion. Auricular fibrillation is a complete irregularity, and it persists or even becomes more characteristic on exercise. An electrocardiogram may be necessary, for it gives final proof.

Apex Beat

The apex beat is a clinical guide to the diagnosis of enlargement, and for this purpose is more reliable than percussion, which is certainly a waste of time in early or doubtful cardiac disease. Admittedly it cannot always be felt, though this in itself makes enlargement unlikely. A diffuse impulse is not an indication of enlargement. The apex beat is the lowest and outermost point at which the examining finger is raised by the heart. In disease the apex beat may be displaced and it may be too forcible; it is advantageous to separate in one's mind the position and the force, because either may give the clue and either may reinforce the other in its diagnostic significance.

It is remarkably how seldom the apex beat is found beyond its rightful place unless the heart is affected; hence its permanent value in diagnosis. In a heavy patient the apex beat, if felt at all, is often lifted by the high diaphragm out to the nipple line. With a rapid heart the apex beat may be jerky and seem to be displaced or forcible, or both, and yet there may be no enlargement. Wait for the tachycardia to subside, when re-examination will resolve any doubt on this score. The apex beat is often displaced simply from twisting of the thorax by scoliosis. Turn the patient round, let him stand at ease, and note a general spinal curvature almost always with a convexity to the right. If there is doubt, radioscopy will quickly decide that the heart merely lies a little to the left in the chest, and that it is not enlarged. If neither tachycardia nor scoliosis explains an apex beat beyond the nipple line, and the lung is not fibrotic, the sign indicates cardiac enlargement.

Listen for the harsh murmur and feel for an aortic systolic thrill (aortic stenosis), and listen closely with ear attuned for an aortic diastolic murmur (aortic incompetence), the most likely cause of enlargement being valvular disease. Hypertension is a less likely cause in an actual or would-be combatant. When the apex beat is too forcible at a normal or moderate rate it will probably lie in or outside the nipple line, and the assumption will be that it means an enlarged and therefore a diseased heart.

Auscultation

In auscultation generally it is better not to listen too long, but to pause and try again. A stethoscope should fit loosely in the ears; if tight it dulls the hearing. It is a mistake to apply the chest-piece only on the assumed apex; if moved an inch internally it may there pick up a localized presystolic murmur.

The heart sounds afford little help apart from this important exception—the sharply-loud first sound at the apex suggestive of early mitral stenosis. The sign is most significant if the rate is normal or moderate, for tachycardia itself may sharpen the first sound. The diagnosis of mitral stenosis should never rest along on the sudden (or snapping) first sound; and it will generally prove possible to elicit the diagnostic presystolic murmur in such a case. Get the subject to swing or exercise his arms briskly, then to lie down and turn towards his left side. Listen during the succeeding half-minute for the short rumbling presystolic murmur of mitral stenosis. But there must be no doubt about it; so significant a sound must be truly heard or not accepted. Duplication of the first sound without accentuation is occasionally heard in normal hearts, and it may even be suggested in the feel of the apex beat and feebly imitate the purr of a thrill. A loud aortic second sound in young people should be a reminder of the possibility of missing a faint aortic diastolic murmur which the loudness of the second sound is apt to hide. A loud pulmonary second sound may add to the probability of mitral stenosis.

MURMURS

A thumb on the right carotid artery (internal to the sterno-mastoid) is the best guide in the timing of a murmur. A systolic murmur at the base may generally be ignored if soft, and obvious only in recumbency. If loud or long and constant it may mean on the left (pulmonary area) a congenital lesion, or on the right (aortic area) rheumatic aortic stenosis, and a confirmatory thrill will be felt by a light hand, especially with the patient leaning forwards after an expiration. The aortic second sound may be absent for the same reason that a diastolic murmur may be present—because of the fixed stenotic valve.

A systolic murmur at the apex gives most trouble, and no diagnosis is satisfactory which depends on the evidence of a systolic murmur. If at all difficult to hear, being soft and short; if louder at the end of inspiration; if varying much with posture, it is probably functional and can be neglected. A systolic murmur produced only by exertion is also negligible. If constantly heard during standing and recumbency, still more if harsh and long, it demands close investigation. Is there a history of rheumatism or chorea? Is the man short-winded? Is the first sound replaced by the murmur? Or, best of all, can the presystolic murmur of mitral stenosis be elicited on listening quickly at the apex when the subject briskly exercises, promptly lies down and turns over towards his left side? Even if not, the man with a forcible apex beat slightly or doubtfully displaced, and with a noticeable and invariable systolic murmur, should be under suspicion of rheumatic mitral disease. If the murmur is palpable (a systolic thrill) the term "mitral incompetence (rheumatic)" is permissible, though mitral stenosis will almost certainly coexist. Alternatively, a systolic murmur at the apex may easily be a clinical hint of aortic incompetence. Anaemia is a fruitful source of systolic murmurs, basal and apical.

So important is the discovery of an aortic diastolic murmur that not merely the aortic area but the left border of the sternum should be searchingly auscultated in a quiet room, preferably with the ear on the chest, the patient leaning forward and pausing at the end of expiration. The secret of the diagnosis of early aortic incompetence is thus to listen with the direct question in one's mind: Is there a diastolic murmur or not? Forgotten may be the collapsing pulse and capillary pulsation of the

fully developed disease. Once the aortic diastolic murmur is surely heard, and confirmed preferably by others, the diagnosis is certain. Below the age of 35 it is rheumatic; after that age it may be syphilitic (history; W.R.).

Congenital Heart Disease

Congenital heart disease will be suggested by a history of a cardiac murmur or "heart trouble" from infancy, by cyanosis, or by an obvious murmur (and thrill) loudest towards the pulmonary area and not conforming to the familiar pattern of acquired valvular disease. Cyanosis with clubbed fingers and a pulmonary systolic murmur (and thrill) in a young adult generally represents *Fallot's tetralogy*—that is, pulmonary stenosis with a ventricular septal defect.

Most congenital heart cases without complication are free from cyanosis. A loud hissing systolic murmur in the third and fourth left spaces (mid-precordial), if the only sign, means a *ventricular septal defect*. A systolic-diastolic continuous murmur ("like machinery") in the pulmonary area implies a *patent ductus arteriosus*. The rare occurrence of a congenital *dextrocardia* will be remembered, though dextrocardia is more often acquired and due to a fibroid lung. An *auricular septal defect* may explain a displaced apex beat with a pulmonary systolic murmur, and radiology reveals the huge pulmonary artery and its branches, which are almost diagnostic.

Blood Pressure

The blood pressure should be estimated if the apex beat is displaced or forcible without other cause, or if the aortic second sound is accentuated. Tachycardia often raises the first systolic reading and therefore should be allowed to subside. If only for this reason the patient is better lying down. A reading by the palpatory method is a useful control. Only figures persisting after a fair interval of rest (lying down) at or above 160 systolic and 90 diastolic should be regarded with any misgiving. Re-examination on another day is then advisable. A high diastolic reading (over 100) is especially significant. The urine may contain albumin. Rarely, coarctation (congenital stenosis) of the aorta explains an unexpected hypertension in relative youth. Deficient femoral pulsation, dilated collateral arteries about the scapulae, and *x*-ray evidence of rib erosion by collateral vessels will establish the diagnosis. A high systolic and low diastolic blood pressure will prompt an examiner to listen once again for an aortic diastolic murmur.

An electrocardiogram will be necessary only in special cases, notably those with a perplexing irregularity, or with exceptional bradycardia or tachycardia. It may serve in the diagnosis of a congenital anomaly or a valvular lesion, or in distinguishing between them.

X-ray examination, radioscopy for choice, is desirable where the presence or absence of enlargement must be established; and it is now more widely known that the heart assumes a characteristic form in congenital and valvular diseases—though not always in the slighter cases—which may consolidate a cardiac diagnosis.

Acute Rheumatism.—Sodium salicylate is considered a specific anti-rheumatic drug and must be given in large doses for at least six weeks. Tachycardia alone is not an indication for unlimited rest, but should be treated by digitalis and "careful mobilization."—Polyarthritis Rheumatica Acuta in Children. C. F. van der Merwe.—*S. Afr. med. J.*, June 24, 1939, **13**, 455.

EMERGENCY PREPARATION OF PYROGEN-FREE WATER

BY

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The production of distilled water free from pyrogens requires the special precautions regarding distillation and autoclaving laid down in the monograph in the *British Pharmacopoeia Addendum,* 1936. A civil or military emergency may give rise to a sudden demand for very large quantities of intravenous saline. Here is described a method whereby tap-water or unsatisfactory distilled water may be readily freed from pyrogens, even though only the most primitive laboratory facilities are available.

Pyrogens were first described by Hort and Penfold (1911). Their exact nature was thoroughly established by the work of Seibert *et al.* (1923, 1925; Bourn and Seibert, 1925). Banks (1934) and Co Tui *et al.* (1936, 1937, 1939) have also carried out research on this subject, and many other American authors have studied pyrogens from a clinical point of view (Walter, 1935, 1936; Rademaker, 1930, 1933; Thompson, 1933). Although it is not yet widely enough realized, the cause of pyrexial reactions following intravenous injection has been definitely established, and many of the traditionally accepted factors have been proved to be of relatively little importance. Pyrogenic agents are filterable thermostable products of the growth of certain strains of bacteria that are ubiquitous enough to infect any water that is not kept absolutely sterile. These bacteria grow very rapidly in distilled water, and large quantities of pyrogen can be formed in a day in water kept at room temperature. Ordinary autoclaving does not destroy pyrogens, but water can be freed from them by distillation.

To obtain pyrogen-free water the still used must be fitted with vapour baffles to prevent passage of droplets, and the condensing system should be of such a design that it can readily be kept scrupulously clean. All glassware must be carefully cleaned immediately before use, and for storage the water (or solutions prepared from it) should be autoclaved and sealed very shortly after distillation.

Importance of Pyrogens

A typical pyrogenic reaction consists of a rigor and feeling of chill any time from fifteen minutes to eight hours after the injection. There is a sharp rise in temperature and pulse rate. The reaction is followed by profuse sweating and a fall in temperature. There may also be nausea, vomiting, headache, and albuminuria.

It is difficult to estimate the amount of damage done by these reactions. They are often stated to be relatively harmless, but surgeons and physicians agree that they are a highly undesirable toxic side-action of saline therapy. Owing to the fact that a considerable proportion of patients who receive saline infusions are in a dangerous condition, it is not possible to estimate how far pyrogenic reactions may be an actual cause of death.

Testing for Pyrogens

Seibert and Mendel (1923) and Banks (1934) have described a satisfactory technique for the detection of

pyrogens by measuring the increase in rectal temperature produced by intravenous injection of the solution into rabbits. Stringent precautions are necessary to ensure that the temperatures are unaffected by any other factors throughout the experiments. Our method of testing differed from that given by these authors only in that we used larger numbers of animals for each test and took 20 c.cm. as a standard volume of normal saline for injection—corresponding roughly to 500 c.cm. in an adult human.

A positive reaction is shown by a sudden sharp rise in temperature of 1° to 4° F. within two hours of the injection, the temperature returning to normal within four hours. The response may be estimated in two ways: (*a*) Average (for all animals injected) of the difference between the highest temperature recorded after injection and the highest temperature recorded before injection for each rabbit. (Seibert measured the differences between the highest and lowest temperatures recorded throughout the entire day, but we found that the measurement stated gave more reliable results.) (*b*) Determination of the number of positive reactions by inspection of the temperature charts of the animals used.

It should be noted that the amount of organic impurity in water as found by the permanganate test is not necessarily an index of the pyrogen content, although it has been used for this purpose by some authors.

Reliability of Test

Considerable care and experience are required in carrying out the test, as the rabbit's temperature is readily affected by excitement. We found, however, that the method gave very consistent and reliable results in distinguishing pyrogenic from non-pyrogenic waters. For purposes of comparison we took as standards solutions from two distinct sources, samples of which were tested at frequent intervals over a wide period. The results are summarized in Table I.

TABLE I.—*Action of 20 c.cm. Normal Saline (Sources A and B) Injected Intravenously into Rabbits*

	Controls	A	B
Number of animals used	31	29	27
Average rise in temperature produced (° F.)	−0.10*	0.25	1.68
Number of positive reactions by inspection of temperature charts ..	0/31	1/29	26/27

* For this figure the difference between the maximum temperature in the afternoon and the maximum temperature in the morning was recorded, injections being always carried out about midday.

Since the response of individual rabbits to injection of pyrogen was found to be in extent subject to the same variation as any other biological phenomenon, we considered it advisable to establish statistically the limits of accuracy of the rabbit test. We accordingly submitted the results obtained with solutions A and B to analysis. Dr. W. O. Kermack kindly advised us as to how to proceed. Analysis showed that if five rabbits were used and an average rise of 0.8° F. was taken as a positive reaction, then the chance of a rise at least as great as this occurring with a non-pyrogenic water was 1 in 20, and the chance that a pyrogenic water should give a rise equal to or less than this was also 1 in 20.

Clinical Significance of Animal Test

Various authors (Co Tui *et al.*, 1937, 1939; Banks, 1934; Rademaker, 1930, 1933) have shown that solutions found to be pyrogenic by testing in animals produce undesirable reactions on injection into patients, whereas no unpleasant symptoms are associated with injection of solutions found non-pyrogenic by this method. The rabbit test has been used as a control in the preparation of commercial solutions for intravenous injection that have given general satisfaction.

The pyrogenic water taken as a standard (B, Table I) was one employed for preparation of intravenous saline. Clinical experience had indicated that, while not unusable, it was unsatisfactory. The rabbit test thus provided clear information regarding pyrogens present in quantities likely to be encountered in actual clinical practice.

Removal of Pyrogens by Charcoal

That water could be freed from fever-producing substances by an adsorption process was suggested to us by the work of Co Tui *et al.* (1936, 1937, 1939) on the removal of pyrogens from solutions by passage through a Seitz asbestos filter. We studied the actions of the following common adsorption agents on pyrogen; aluminium oxide, kaolin, novasorb (magnesium trisilicate), kieselguhr, fullers' earth, powdered charcoal, and granular charcoal.

A constant supply of pyrogenic water was ensured by inoculating 20 litres of distilled water contained in a large glass jar with 100 c.cm. of a non-autoclaved sample of water B (Table I). The contents of the jar became strongly pyrogenic in a day or two. As water was drawn from this store distilled water was added to keep the volume at 20 litres. From time to time the water was tested for pyrogen content, which showed no signs of diminishing. Dr. J. C. J. Ives of the bacteriology department very kindly examined a sample of water from the reservoir, and from it isolated strains of bacteria which were capable of growth in distilled water and formed pyrogen.

In testing the adsorption agents it was found convenient simply to shake a weighed amount with a measured volume of the pyrogenic water. After shaking for fifteen minutes the solid was removed by means of a Jena glass filter or a fluted filter paper. Control experiments showed that filtering the pyrogenic water in no way affected its fever-producing properties.

We found that powdered charcoal was a powerful adsorbent of pyrogens, being much superior to any of the other agents examined. The following powdered charcoals were examined: ultracarbon (Merck), activated (B.D.H.), animal, wood, Norit A, blood (B.D.H.). There was little to choose between any of these in pyrogen-adsorbing power. In Table II are summarized the results obtained for the pyrogen content of the standard water after treatment with powdered charcoals. These results are of interest in relation to the preparation of non-toxic inulin by the use of charcoal (*cf.* Co Tui *et al.*, 1937). The following varieties of granular charcoal were examined: ultracarbon (Merck), activated (B.D.H.), animal (B.D.H.), wood (B.D.H.), sugar (B.D.H.), coconut shell (B.D.H.). None of these removed pyrogens from water, except when part was broken down to powder. The results are shown in Table II.

As the method of testing adsorptive powers described above might not be considered a fair one for granular charcoals owing to the difficulty in bringing them into intimate contact with the liquid, and since the adsorption process is possibly an equilibrium one, these were also examined by means of adsorption towers 20 cm. long

and 2 cm. in diameter. In spite of the fact that great care was taken to ensure that the liquid came into intimate contact with the charcoal, the granular charcoal failed to pick up pyrogens. The average rise in temperature produced on injection of the water after passing through the tower was 1.5° F. and the number of positive reactions noted was 12 in 13. The results thus

TABLE II.—*Pyrogen Content of Standard Water after Shaking with Charcoal*

	Controls	Powdered Charcoal			Granular Charcoal
Grammes of charcoal per 100 c.cm. of water ..	—	1.0	0.1	0.01 (B.D.H. activated)	1.0
Average rise in temperature (° F.)	2.14	0.20	0.27	0.32	1.22
No. of positive reactions by inspection of temperature charts ..	9/9	1/31	1/16	0/4	21/30

parallel those obtained by the shaking technique. We were reluctant to come to the conclusion that granular charcoal was completely useless for this purpose, as the possibility had been entertained of making use of it in an automatic pyrogen-removing filter. It was found possible to remove pyrogens from large quantities of water by forcing under pressure through a bed of powdered charcoal. This method, however, seems to have no advantage over the use of large-scale Seitz asbestos filters.

The results show that a strongly pyrogenic water or solution may be freed from pyrogens by the simple procedure of shaking for a few minutes with a very small quantity (0.1 per cent.) of powdered charcoal. This quantity of charcoal can be readily removed by allowing the liquid to stand for a minute or two and then decanting through a fluted filter paper. The receiving vessel, which must be spotlessly clean, should be washed out with a little of the filtrate before collecting the remainder. Although there seems to be little to choose between different charcoals as regards efficiency in picking up pyrogens, from the point of view of cheapness, availability, and chemical cleanliness B.D.H. activated powder seems the most suitable for this purpose.

Summary

Shaking for fifteen minutes with powdered charcoal (1 part per 1,000) removes pyrogens from heavily contaminated water. The charcoal can be readily separated by decanting through a filter paper. This provides a simple emergency method for obtaining water suitable for preparation of intravenous infusions.

We desire to express our thanks to Professor A. J. Clark for his continued interest and advice in carrying out this research. The expenses of the work were defrayed from the Moray and Crichton (J.C.L.) Funds of Edinburgh University.

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DENTAL ANAESTHESIA IN CHILDREN

A COMPARISON OF VINYL ETHER AND ETHYL CHLORIDE IN A SERIES OF 200 CASES

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Within the last few years vinyl ether has taken its place among the agents employed to produce relief from pain. It is a quickly acting anaesthetic of low toxicity, and its use in dental anaesthesia has been favourably reported upon by Goldman (1936, 1937), Ramage (1937), Roche (1937), and others in this country, and by Gunter, Beach, and Looby (1936), Feldman and Cartin (1938), Rosamilia (1938), Lyons and Frank (1939), and Cartin (1938), among others, in America.

It is not our purpose here to discuss the physical properties of the drug or the various methods of administration, but to describe briefly the results using one method only, and compare them with those obtained from the use of another anaesthetic of the same type—namely, ethyl chloride.

In this series 200 cases were treated: 100 received vinyl ether and 100 ethyl chloride. The patients were all children attending the dental clinic of the School Medical Service in Coventry, or children under 5 years of age referred for dental treatment from the Coventry Child Welfare Centres. The investigation covered a period of four months (February to May, 1939). At the start it was intended to make this a strictly controlled experiment, allocating alternate cases to each anaesthetic, but for reasons which will be discussed later a certain amount of selection had to be exercised. Broadly speaking, however, the groups were comparable. The anaesthetics were all administered by one of us (J. O. F.) and the extractions were performed by the other joint authors.

No premedication was used, but parents were asked not to let the children have breakfast on the morning the anaesthetic was to be given. The extractions were done in the sitting posture in an ordinary dental chair; straps were not employed in restraint, and no prop or gag was inserted before beginning the anaesthesia. A throat pack was inserted in all cases.

Both anaesthetics were given by the closed method—vinyl ether with the Goldman inhaler, in the manner described by Goldman (1936), and ethyl chloride with a similar closed apparatus, the drug being volatilized rapidly by placing the container in hot water. The duration of the different stages of anaesthesia was timed by a dental attendant on signals by J. O. F. The amount of vinyl ether used was 3 or 5 c.cm., and of ethyl chloride 3, 4, or 5 c.cm., according to the age of the

patient. Table I shows that the two groups of cases were similar in respect of most factors which might have influenced the course of anaesthesia. There is a difference, however, in the age distribution. This will be discussed later.

TABLE I

	Vinyl Ether	Ethyl Chloride
Sex distribution :		
Males	40	48
Females	60	52
Age distribution:		
Under 5 years	33	16
5-9 years	51	47
10 years and over	16	37
Associated diseases :		
Rhinitis	3	1
Cleft palate	1	—
Blepharitis	1	—
Chronic bronchitis	1	—
Tuberculous cervical adenitis	—	1

The results obtained will be tabulated under certain headings and will then be briefly discussed.

Induction Period

TABLE II.—*Showing the More Important Features of the Induction Period*

	Vinyl Ether	Ethyl Chloride
Struggling during induction :		
None	57	77
Slight	25	17
Moderate	13	4
Marked	5	2
Duration in seconds of induction period :		
Mean	40.7	52
Shortest	15	30
Longest	70	85

The induction period was noticeably quieter in the cases given ethyl chloride. We attributed this largely to the fact that vinyl ether has an unpleasant smell, but it was probably also because a greater number of the ethyl chloride patients were in the over-5 age groups, and we found children of these ages to be more co-operative and reasonable. With vinyl ether the occurrence of struggling and shouting during the induction appeared to have some influence on the nature of the resulting anaesthesia, rendering it both lighter and shorter than in cases in which the child had been reasonably quiet throughout. Similarly, when the patient was exceptionally quiet during induction and breathing was shallow the anaesthetic did not seem to be well absorbed, the anaesthesia being in such cases also both lighter and shorter than when breathing had been of the normal character. These variations were not noted with ethyl chloride.

The length of the induction period is of little importance in itself, but, as the figures show, it was slightly shorter with vinyl ether. In this connexion it may be stated that the anaesthetic signs with vinyl ether are so slight and so variable that it is easy to miss the optimum moment of anaesthesia. Cartwright (1939) has stressed this point. Attempts to lengthen the duration of vinyl ether anaesthesia by increasing the time during which the mask was held on the face merely resulted in the period of effective anaesthesia being correspondingly reduced. This was not the case with ethyl chloride; and with ethyl chloride, moreover, the anaesthetic signs were much more definite.

Nature and Duration of Period of Effective Anaesthesia

TABLE III.—*Showing the More Important Features of the Period of Effective Anaesthesia*

	Vinyl Ether	Ethyl Chloride
Duration in seconds of effective anaesthesia :		
Mean	42.1	67.55
Shortest	Nil	30
Longest	70	180
Relaxation of jaw :		
Good	72	48
Moderate	16	24
Poor	12	23
Impossible to open mouth	—	5
Cyanosis :		
None	75	50
Slight	19	30
Moderate	6	14
Marked	—	6
Excessive salivation	28	11
Lacrimation	44	16
Cough	13	5
Loss of bladder control	1	3

TABLE IV.—*Number of Teeth Extracted*

Teeth Extracted	Vinyl Ether	Ethyl Chloride
Mean number	5.61	6.04
Maximum number	13	15
Actual number :		
0	2*	4†
1-3	17	21
4-6	52	37
7-9	21	24
10-12	7	13
13-15	1	1

* In one case because the anaesthetic appeared to be quite ineffective; in the other because the tooth which the dentist first attempted to remove crumbled and the period of anaesthesia had ended before any extractions could be made.

† In one case because the anaesthetic was given only for the incision of an eruption cyst; in two cases because rigidity of the jaw rendered it impossible to open the mouth; and in one case because tonic spasm of the limbs made extractions impossible although relaxation of the jaw was satisfactory.

Very much better relaxation of the jaw was obtained with vinyl ether than with ethyl chloride. Relaxation was not wholly satisfactory in 52 per cent. of the ethyl chloride cases, and in five it was impossible to open the mouth during the period of anaesthesia. In only two cases, however, did the operation have to be abandoned on this account; in the other three the required extractions were done during the analgesic period.

Cyanosis appears to be almost a natural concomitant of the administration of ethyl chloride, being met with in

50 per cent. of cases. With vinyl ether it was seen in 25 per cent. of cases; but the cyanosis of vinyl ether is an unpleasant slaty colour, unlike the florid cyanosis of ethyl chloride. In no instance did cyanosis cause alarm with either drug.

Excessive salivation occurred much more often with vinyl ether, and was a really troublesome feature of the anaesthetic, making the surgeon's work very difficult. This is an undesirable characteristic of vinyl ether administration, but it could doubtless be avoided by suitable premedication.

Effective anaesthesia was found to be distinctly longer in duration with ethyl chloride. The mean period of effective anaesthesia with vinyl ether was 42.1 seconds, which compares very unfavourably with the mean period of 67.55 seconds for ethyl chloride. It was on this account that we were compelled to abandon the idea of making a strictly controlled experiment, because it speedily became apparent that with older children, who required more numerous extractions, the work could not be completed under vinyl ether anaesthesia. Especially was this so if permanent teeth had to be removed. In nine of the vinyl ether cases the anaesthesia produced was too short to permit all the intended extractions to be undertaken. This occurred only twice with ethyl chloride. In four of the nine cases in which vinyl ether produced too short anaesthesia to finish the necessary extractions the facepiece was reapplied and a further 3 c.cm. of the drug given; but this was never satisfactory, as the presence of blood and saliva made the ensuing operation difficult and unpleasant for both surgeon and anaesthetist.

It was soon found that vinyl ether was almost wholly unsuitable for the removal of permanent teeth, especially molars; it was also found to be unsuitable for the removal of very carious teeth, which were apt to crumble. If the tooth was not removed at the first attempt the anaesthesia was too short. We were therefore compelled to exercise a certain amount of selection, and to give ethyl chloride to cases in which difficulties from this cause were to be anticipated. In other less well defined ways the short anaesthesia of vinyl ether was found to be disadvantageous. It allowed no margin for the occurrence of minor accidents of extractions under general anaesthesia—for example, the slipped gag, the difficult insertion of a throat pack, the dropping of a pair of forceps—events which are bound to occur from time to time. With ethyl chloride these things did not matter; with vinyl ether they were of serious import.

Attention must be drawn to the fact that there is apparently no period of analgesia with vinyl ether, but this is not true of ethyl chloride. With vinyl ether the patient seems to be sufficiently conscious to feel *and to remember* pain, whenever the forty seconds or so of anaesthesia has ended. Three patients who had had vinyl ether stated afterwards that they had felt the last tooth coming out. While pain may also have been felt by some of the ethyl chloride patients, none of them remembered it, and, furthermore, it may be reiterated that in three of the ethyl chloride patients in whom rigidity of the jaw prevented opening of the mouth during anaesthesia the required extractions (to the maximum number of three) were done during the analgesic period without discomfort to the patient. When all these factors, therefore, are considered we are of the opinion that ethyl chloride is more satisfactory than vinyl ether.

Finally we may say that we agree with Rosamilia (1938), who, speaking of vinyl ether, states that "its use requires more than ordinary diligence and perfunctory care: it demands intense application and extreme care." We believe that the routine use of ethyl chloride in dental clinics imposes much less strain both on the surgeon and on the anaesthetist. This is a factor of no small importance in such work, when extractions under anaesthesia are being done for several hours.

Nature of Recovery Period

At first an attempt was made to measure accurately the duration of the recovery period, but this soon had to be abandoned on account of non-cooperation on the part of our young patients, many of whom refused to answer their names or to give other definite evidence of return to full consciousness, though one knew very well they had reached that state. Generally speaking, however, it was noticed that full consciousness returned much more quickly with vinyl ether than with ethyl chloride. With the former the patient had usually recovered within a minute, with ethyl chloride not for two or three minutes, though exceptions occurred to both these rules, and in many cases there was confusion for several minutes. Seven of the vinyl ether patients and ten of the ethyl chloride patients were exceptionally noisy and uncontrollable during the recovery period.

Vomiting immediately after the anaesthetic occurred in ten cases, and these had all had ethyl chloride. There can be little doubt that it is more inclined to have this undesirable effect than is vinyl ether; but the upset does not last long, and in half an hour or less all patients were able to walk out of the clinic to go home.

Unfortunately we were not able to follow up our cases systematically to learn if the anaesthetics had any delayed effects, but certain patients who did report at the clinic for further treatment gave no history of undesirable sequelae with either substance.

Summary and Conclusions

A series of 200 children were given anaesthesia for extraction of teeth under similar conditions with (*a*) vinyl ether or (*b*) ethyl chloride.

The results showed that these are both safe and useful anaesthetics.

The action of vinyl ether is shorter and less certain than that of ethyl chloride, but it is useful for producing a short anaesthesia for the extraction of a few deciduous teeth in young children.

Vinyl ether is more likely to cause struggling during the induction period, and this is attributed in part to its unpleasant smell.

Vinyl ether causes troublesome salivation in many cases, but seldom produces rigidity of the jaw; recovery from the anaesthetic is very rapid.

Ethyl chloride may cause troublesome rigidity of the jaw, but when this is overcome it is very certain in its action and duration, and may be used in children of all ages for the extraction of any teeth, deciduous or permanent.

Recovery from ethyl chloride is slower than recovery from vinyl ether, and is more likely to be accompanied by vomiting, but these factors do not contraindicate its use.

Our thanks are due to Miss Batsford, dental nurse, for her interested co-operation, and to Miss M. Dinan, Miss F. Gayton, and Miss M. Ward, dental attendants at the Central School Clinic, Coventry, for their accurate time-keeping, which made the work of this experiment possible.

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AN INQUIRY INTO THE HOUR OF BIRTH

BY

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An investigation into the relative frequency of deliveries by day to deliveries by night has been carried out in a small series of 2,225 patients delivered per vaginam during the years 1934–7 at the Royal Free Hospital. The following table shows the number born during these years, arranged according to the time at which the birth occurred.

TABLE I

Births by Day

	8-10 a.m.	10-12	12-2 p.m.	2-4 p.m.	4-6 p.m.	6-8 p.m.	Total
Primiparae: 1934 ..	11	29	27	28	25	26	146
1935 ..	27	42	36	26	42	26	199
1936 ..	33	39	44	56	53	45	270
1937 ..	43	42	39	38	41	41	244
Total ..	114	152	146	148	161	138	859
Multiparae	32	25	44	36	52	36	225
Total ..	146	177	190	184	213	174	1,084

Births by Night

	8-10 p.m.	10-12	12-2 a.m.	2-4 a.m.	4-6 a.m.	6-8 a.m.	Total
Primiparae: 1934 ..	29	23	16	23	24	17	132
1935 ..	29	36	42	46	40	23	216
1936 ..	48	42	45	44	41	37	257
1937 ..	51	42	43	42	49	35	262
Total ..	157	143	146	155	154	112	867
Multiparae	47	43	46	43	45	50	274
Total ..	204	186	192	198	199	162	1,141

If we reckon " night " as from 8 p.m. to 8 a.m. there are over the total series 5.25 per cent. more births by night than by day, the preponderance of night births over day births being smaller in the primiparae than in the multiparae. Only 0.9 per cent. more primiparae are delivered by night than by day, whereas the corresponding figure for multiparae is 22 per cent. It would be unwise, however, to draw any inference from this variation, considering the small numbers in our group of multiparae.

The following table shows the comparison between night and day figures for primiparae only.

TABLE II

1934	146 by day	and	132 by night	(100 day, against	90.4 night)
1935	199 „	„	216 „	(„ „	108.5 „)
1936	270 „	„	257 „	(„ „	95.2 „)
1937	244 „	„	262 „	(„ „	107.4 „)
Total ..	859 „	„	867 „	(„ „	100.9 „)

It will be seen that the yearly figures vary slightly around 100 (– 9.6 per cent. to + 8.5 per cent.), and for 1934 and 1936 show a smaller number of births during the night than during the day. These variations are well within the limits of probable error, and suggest a comparatively even distribution of births over night and day. When, however, the records as to the hour of birth in other centres [as published by Guthmann and Bienhüls, 1936, Dyroff and Mulhäuser (Ritala, 1931), Lane (Halban and Seitz, 1927, 1929), Meyer, 1935, Knapp, 1909–10, Lynch, 1907, Veit (Nathanson, 1935), White (Puppel, 1932), Birlinski (Quigley, 1931)] are studied, it is found that in over 180,000 cases there is a slight predominance in the number of cases delivered by night over those delivered by day. It must be noted here, however, that the definition of " night " varies between 7 p.m. to 7 a.m. and 10 p.m. to 10 a.m., according to the different authors. Meyer (1936), Jenny (1933), and Guthmann and Bienhüls (1936) find that year by year the number of children born by day is increasing. In our small series no such increase is found.

May one perhaps assume that the great diversity of opinion in the literature as to the hour when most births occur is some support for our contention that the distribution throughout night and day is relatively even? The following is a list of the most usual and the least usual incidence of the hour of birth according to different writers:

	Maximum	Minimum
Royal Free Hospital	4 p.m. ..	8 a.m.
Knapp	11–12 p.m. ..	6–7 p.m.
Jenny	5 p.m. ..	5 a.m.
Veit	1 a.m. ..	5 p.m.
Guthmann and Bienhüls	11 a.m. ..	—
Birlinski	4 a.m. and 1 p.m. ..	7 a.m. and 8 p.m.
Lynch	8–9 a.m. ..	1–2 p.m.
Henry (1932)	3 a.m. ..	2 p.m.

Summary and Conclusion

An investigation into the relative frequency of deliveries by day to deliveries by night has been carried out in a small series of 2,225 patients delivered per vaginam.

The variations are well within the limits of probable error, and suggest a comparatively even distribution of births over night and day.

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Dr. Lucien Dautrebande, professor of pharmacology at Liége University and member of the Royal Academy of Belgium, has been awarded the Montyon prize for his work on the toxicology of war gases and the vapours of solvents used in industry.

Clinical Memoranda

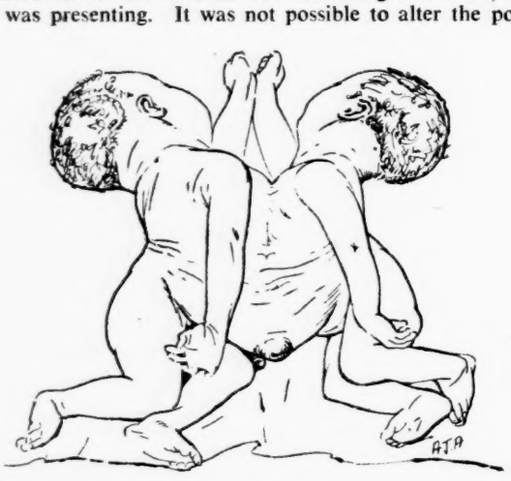
"Siamese Twins"

No attempt is made here to discuss the condition of "Siamese twins" in detail, as many papers have already been produced on the subject. The essential abnormality is that the cardiovascular system is extensively fused, hence the danger in attempting to separate the twins if they are born alive. Other mesodermal structures are often abnormally developed. The two nervous systems are entirely separate and function individually. The vascular communication results in each twin having a similar blood chemistry. The many possible changes in blood chemistry voluntarily induced by one twin—for example, by alcohol consumption—involuntarily affects the other. Hormonal changes due to pregnancy have also been recorded. The following notes are worth placing on record because of the comparative rarity of this condition.

CASE REPORT

The mother, an African native of the Mandinka tribe, Gambia, first came under observation when thirty-four weeks pregnant. Twins were diagnosed, though only one foetal heart was heard. She had had three live births, but no miscarriages. All labours were reported difficult. Pelvic measurements were not taken. The woman was of a tall slight build.

On the morning of November 8, 1939, one child was in a right occipito-anterior position and the second was thought to be a breech. Labour began at 4 o'clock in the afternoon, and the patient called for help at 8 p.m. No foetal heart was now heard. At 2 a.m. the following day the membranes ruptured. A vaginal examination was then made as progress appeared slow. The cervix was three fingers dilated, and a face was presenting. It was not possible to alter the position



of the head, which delivered spontaneously at 2.30 a.m. A hand and an arm came down at 3 a.m. On examination at this stage a second head was found to be following the first. It appeared to be lying on the chest of the first infant; the hand and arm already down belonged to the second infant. It was impossible to push up the second head. At 6 o'clock the two heads advanced, and a little later the fusion of the chests made it apparent that the condition was one of "Siamese twins." At 6.10 there was considerable advance, and at 6.15 the two bodies were delivered at the same time. In spite of this enormous mass the perineum was not even torn. The children had apparently died at an early stage of labour.

There was only one placenta and only one cord. A slight degree of exomphalos was present. The intestine could be seen through the thin membrane at the base of the cord. The membranes and placenta were delivered complete at 5.30. About 10 oz. of blood was lost after delivery. The mother's condition throughout was good. The twins were joined face to face from about the xiphoid of the sternum to the lower abdomen (see illustration). There was only one umbilicus. They were well-formed female infants of the usual yellow-brown colour of African babies, with black curly hair. Each had two breasts, and together they weighed 10 lb. African infants are on an average smaller at birth than European children—usually 5 lb. in this district.

A post-mortem examination was not permitted. The mother's convalescence was entirely uneventful; the temperature did not rise above 99° F.

CHARLES BOWESMAN, M.D., F.R.C.S.Ed.
Gambia, West Africa.

Appendicitis in Old Age

This case is, I think, noteworthy for two reasons: first, it is the history of an initial appendicular attack at the age of 83; and, secondly, it records recovery at the age of 84, six weeks after an operation for the removal of a perforated appendix with general peritonitis. The absence of any great variation in the temperature and in the pulse rate is also noteworthy. It is perhaps significant that the patient was fearless of the future and was mentally calm and confident throughout her illness.

CASE HISTORY

On February 13, 1938, I was asked to see a case of acute abdominal pain in an old lady aged 83. She had a history of pain in the right iliac fossa, which had started two days previously. There were no symptoms other than the pain.

On examination a swelling the size of a small orange could be felt, fixed in the right iliac fossa. The temperature was 100°. A diagnosis of acute appendicitis with local adhesions was made, but in view of the patient's age operation was not advised. A week later her temperature was normal, and all symptoms of pain had gone by February 22, except for some slight persisting local tenderness. After three weeks the swelling had disappeared.

During the following nine months there were two or three slight attacks of iliac pain, but no rise of temperature or pulse rate; there had been no vomiting. On November 20, 1938, she had a rather more severe attack which lasted for four days; but, apart from occasional abdominal discomfort, no further symptoms developed until November 12, 1939. On that day definite acute appendicular symptoms again appeared, and two days later, when I saw her for the second time, there were signs of peritonitis, with diffuse pain over the lower part of the abdomen, and signs of free fluid there. The temperature was normal and the pulse 82. A diagnosis of perforation of the appendix with general peritonitis was made, and, though hope of recovery was but slender, the patient agreed that an operation should be performed.

The abdomen was opened on the same afternoon and a perforated gangrenous appendix was removed through Battle's incision. There was free infected fluid in the general peritoneal cavity, and this was drained through the incision made for the removal of the appendix and also by a tube in the left iliac fossa. The tubes were removed on the fourth day after the operation, and on the twelfth day the stitches were taken out. The pulse rose to 100 on the day after operation and two days later returned to 80, whereabouts it remained during convalescence. The temperature throughout varied only between 97° and normal. She was able to go home four weeks and two days after the operation, with both wounds soundly healed. Six weeks after the operation she was able to walk downstairs without any pain or discomfort and without any sign of weakness of the abdominal wall.

I am indebted to Dr. M. M. Woods of Balham for the history between the two occasions when I saw the patient.

HAROLD GARDINER, M.S., F.R.C.S.,
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Reviews

TREATMENT OF WAR INJURIES

War and the Doctor. Essays on the Immediate Treatment of War Wounds. Edited by J. M. Mackintosh, M.D., D.P.H., Chief Medical Officer of the Department of Health for Scotland. (Pp. 128. 5s. net.) Edinburgh and London: Oliver and Boyd. 1940.

This little volume, based on a series of lectures delivered to the Edinburgh Branch of the British Medical Association, contains an amount of information out of proportion to its size and of great value at the present time. Its origin necessarily involves a lack of continuity, but this is more than compensated by the individuality to which it has given full scope. It opens with a general discussion by Dr. J. M. Mackintosh on organization, in which the objects of first-aid posts, casualty, base, and special hospitals are well set out. Stress is laid on the supreme importance of dealing radically with wounds at the earliest possible moment and the importance of the casualty hospital for the purpose.

Dr. J. H. MacDonald gives an interesting article on fear neuroses in which he defines and discusses the nature and meaning of shell shock. This is followed by an article on shock and haemorrhage by Sir John Fraser, which furnishes an admirable epitome of modern theory and sound practice in this important field. A short but useful note by J. J. M. Shaw on injuries to the face and jaw is followed by a discussion by Walter Mercer of the treatment of chest injuries, which gives in a short space an excellent account of modern practice. The same author describes the modern treatment of injuries of the upper limb, while W. A. Cochrane discusses the lower limb and gives some useful notes on the modern treatment of amputations. Dr. J. M. Johnston gives a useful epitome on first-aid instruction in war time.

The volume ends with an article on emergency surgery in the field from the pen of Henry Wade which will be read and re-read with delight by everyone who took part in the last war, and which ought to be read and studied by everyone who intends to take a share in the present emergency. It is a record of personal experience such as has fallen to the lot of very few, described with rare genius and insight. This is a first-class book which has appeared just when it was wanted. It is packed with information and with suggestions invaluable in the present emergency, but Henry Wade's article will still live when the emergency is long past.

H. S. S.

ELECTROCARDIOGRAMS

Electrocardiograms: An Elementary Atlas for Students and Practitioners. By H. Wallace Jones, M.D., M.Sc., F.R.C.P., and E. Noble Chamberlain, M.D., M.Sc., F.R.C.P. (Pp. 51; 52 illustrations. 3s. 6d. net.) Bristol: John Wright and Sons, Ltd.; London: Simpkin Marshall, Ltd. 1939.

Drs. H. W. Jones and E. N. Chamberlain have brought together in this small manual examples of the electrocardiograms most commonly encountered in clinical medicine. Assembled in atlas form and supplied with suitable legends, these forty-eight records comprise all but the rarer cardiographic abnormalities. Technical and theoretical matter has been deliberately omitted with the aim of keeping the work strictly within the dimensions required by the medical student, for whom it is felt "electrocardiography should not loom too largely in his knowledge of general medicine." Most teachers of cardiography will agree with the choice and arrangement of these records, which are well reproduced and which illustrate clearly the principal diagnostic features. Although this work is not the first of its kind it is well conceived and carried out, and will undoubtedly be of value to students and others interested in elementary clinical cardiology.

THE BART'S REPORTS

Saint Bartholomew's Hospital Reports. Edited by Geoffrey Evans, George Graham, Geoffrey Hadfield, Charles F. Harris, James Maxwell, Wilfred Shaw, A. Wormall, Sir Girling Ball, J. Paterson Ross, and R. V. Christie. Vol. LXXII. (Pp. 376. 21s. net.) London: John Murray. 1939.

The latest volume of *Saint Bartholomew's Hospital Reports* contains many articles of topical and general interest, as well as items more appealing to former students of the hospital, such as memorial notices of three members of the staff, the proceedings of the hospital societies, and reports of various departments of cancer research and treatment. Mr. Bedford Russell contributes a preliminary report of fifty cases of asthma under treatment in the throat department. He has been impressed by the physical aspects of asthma as contrasted with the psychological, and finds a characteristic oedema of the mucous membrane of the nose and sinuses, observed at operation and clinically, and substantiated by radiological means. These latter appearances, obtained by using lipiodol by the displacement method, are well illustrated. The author's contention is that the fundamental essential lesion in asthma is an urticaria in the sinuses following infections, and that early non-operative treatment should be instituted; in chronic cases operation to relieve the underlying state of affairs has had at least a favourable effect.

An important paper on the treatment of pneumococcal pneumonia with sulphapyridine (M & B 693) includes a report on the bacteriology of the cases observed in the hospital during 1938 and early 1939. Of the lobar pneumonia cases nearly 70 per cent. were caused by organisms of Groups I, II, and III; 41.2 per cent. by Group I; while in atypical pneumonia three-fourths were caused by pneumococci of the higher groups. The typing of cases in hospital work, even with full laboratory facilities, takes time, and chemotherapy offers an immediate and successful aid in treatment of pneumonia. Sulphapyridine is known to influence favourably the course of the disease, though apparently the development of active immunity is not affected. Professor Garrod has investigated the bactericidal properties of gastric juice to assess the strength and value of the acid barrier to swallowed bacteria. The susceptibility to bactericidal action seems to vary in different organisms. Dysentery bacilli are most resistant, *Brucella abortus* and *melitensis* are susceptible, while typhoid and paratyphoid bacilli are intermediate. Gastric juice is more bactericidal than hydrochloric acid of equivalent strength; the presence of sodium thiocyanate accelerates the bacterial action in the absence of organic matter. Apparently milk has little if any inhibiting effect on the action of gastric juice on *Brucella abortus*.

Combined clinical and pathological notes on granulosa-cell tumours of the ovary and on acute hyperparathyroidism give opportunities of discussing the literature of the subject, and a more detailed contribution on cases of regional ileitis gives a good presentation of this interesting condition. The aetiology is still obscure, but it is suggested that the frequent finding of giant-cell systems may be a specific histological response of the

disease; acid-fast bacilli are not found, and histological and immunological evidence of the presence of tuberculosis has been negative. Radiological appearances are often characteristic, and primary resection of the local area with wide excision of the mesentery is usually followed by excellent results. Professor Hadfield presents a description of tumours of the kidney, based on the specimens in the hospital museum, and reviews the recent work on experimental arterial hypertension. A note on a series of cases of chronic mastitis suggests that relief may be obtained by regular injections intramuscularly of testosterone propionate; in most of the patients treated pain was relieved, and in some the lumps in the breast disappeared. A useful summary of the importance of potassium in the animal body and the significance of changes in blood potassium is presented, and further work is projected.

MEDICINE IN 1939

The 1939 Yearbook of General Medicine. Edited by George F. Dick, M.D., J. Burns Amberson, jun., M.D., George R. Minot, M.D., S.D., F.R.C.P., William B. Castle, M.D., A.M., William D. Stroud, M.D., George B. Enterman, M.D. (Pp. 848. 3 dollars; or 15s., postage extra.) Chicago: The Yearbook Publishers; London: H. K. Lewis and Co. 1939.

This handy volume continues to give a useful summary of the trend of medicine. The editors divide the whole subject into portions on circulatory, digestive, infectious, and chest diseases and disorders of the blood and blood-forming organs; there is an adequate index both of subjects and authors, and the general standard is as good as in former years. The publications abstracted represent a fair selection of the work done recently, and it is of interest to estimate the relative importance to the profession of newer methods of treatment and ideas in pathology which have been put forward in more than six thousand articles reviewed. Chemotherapy and the application of the sulphanilamide preparations are of course in the foreground in the treatment of infectious diseases. It is pointed out that there are at least two essential conditions for therapeutic effectiveness: (1) it is necessary to subject the organisms to a concentration of the chemical that will produce maximal bacteriostasis, and (2) the body must retain or acquire the power to rid itself of the disease-producing organism. There is thus scope for both chemotherapy and serum in the treatment of pneumonia, for example. Serum treatment presupposes access to laboratory and hospital because of the need for typing the pneumococcus, giving injections at short intervals, and carefully supervising the patient. In general practice chemotherapy is preferable, though serum could be used in addition in severe cases. Combined use has given some strikingly good results. Early serum treatment offers the best prognosis, making early diagnosis necessary. Sulphanilamide should not be considered a universal remedy for pneumonia and other diseases, as it still requires further critical study. In other diseases of the chest there is an increasing tendency to advocate lobectomy in suitable cases and to report favourable results.

Discussions of the underlying phenomena in arteriosclerosis and the part played by the kidney in hypertension continue to provide a steady supply of papers in the medical journals of the world. Some regard hypertension as a symptom rather than a disease, citing various endocrine, intracranial, and psychic disturbances as factors in aetiology and amenable to treatment. Surgery has by extensive sympathectomy in some authors' hands given sufficiently good and encouraging results in selected cases to justify continuing this method of treatment.

Among the digestive subjects dealt with there is considerable discussion of the secretion of acid in the stomach and the factors which influence gastric acidity, of the diagnosis and treatment of haemorrhage from the stomach and duodenum, and of functional dyspepsia. In a series of cases at the Mayo Clinic in which the last named had been diagnosed it is of interest that later examination revealed evidence of organic gastro-intestinal disease in 11 per cent. only of 354 cases of "functional dyspepsia." In regard to antacids for gastric and duodenal lesions there has been a recent tendency to favour the use of colloidal aluminium hydroxide as well as magnesium trisilicate at the expense of the older familiar antacids. The former are apparently safer in conditions such as renal or hepatic deficiency in that they are less prone to upset the acid-base equilibrium (alkalosis). Gastroscopy is being more widely used in the diagnosis of gastric disorders, but a timely warning is offered that the results so obtained are subjective and recorded by verbal description. Attempts to secure more permanent pictures are being made by drawings and Henning's technique of gastrophotography, but these are of limited application. In the treatment of diabetes there is general consensus of opinion that the zinc protamine preparations have distinct advantages over the ordinary forms. The book is a valuable addition to the practitioner's library.

MADAME CHIANG ON CHINA

China in Peace and War. By Madame Chiang Kai-Shek (May-ling Soong Chiang). Preface by Charlotte Haldane. (Pp. 256; illustrated. 16s.) London: Hurst and Blackett. 1939.

This book is a collection of articles, messages, and speeches given during conditions of peace and war to the newspapers, to colleges, schools, and the general public by Madame Chiang Kai-Shek, wife of the Chinese Generalissimo. It might be justly claimed that Madame Chiang is the most remarkable and outstanding woman in the world of to-day. She would deprecate the title of "uncrowned empress of 500,000,000 people" which has been given her in some quarters, but the fact remains that, next to her husband, she is the second most powerful and important personage in China. She accompanies him wherever he goes, and records her experiences in a fascinating way. In the second chapter of the book the pen-pictures she gives of the rugged loveliness of the remote south-western provinces and of their rich human and industrial progress reveal a wonderful and penetrating power of description that brings these people and places clearly before the reader's eyes. Her devotion to her country and to Generalissimo Chiang, backed by the intuitive soundness of her advice on many national problems, has found an echo in the great trust placed in her by her husband and the Chinese leaders, a trust which resulted in her being put in charge of the Air Force. Notable chapters in the book are "Educating Children of the Revolution," "What Religion Means to Me," "China's Past, Present, and Future." In the sixth section there are war-time messages: "Women of China—Defend Your Country!"; "Are Treaties Dead?"; "Japan's Continental Policy a Peril to the World." But indeed every chapter will well repay perusal. In "During an Air Raid" there is what one might call a psychological revelation in the way the author analyses, watch in hand, the progress minute by minute of a heavy bombing attack. "I am writing this while I sit waiting for the Japanese air raiders to come. The alarm sounded fifteen minutes ago. I came outside as I always do, to watch the raid, and more particularly to observe how our defence is conducted.

When the planes arrive I will write down in order what I see." At 2.42 p.m., with the arrival of Japanese bombers, nine in all, she records till 3.20 p.m. the dog-fight in the air, the chasing, looping, diving, and zooming up again of the Japanese in their clashes with Chinese Hawk pursuers—a thrilling and graphic description which will bring home to us the kind of danger we may yet have to face.

In pure vigorous English—for she was a prize-winner and distinguished graduate of Wellesley College in America—Madame Chiang Kai-Shek reveals the tribulations of a country that is fighting with its back to the wall to repel aggression. Aggression is the hydra-headed monster that we are now immersed in the task of quelling, and we can well recommend *China in Peace and War* to all those who are anxious for "Peace in our time" to come true. Though much of the struggle that is now going on in the Far East is obscured by war at our own doors, it is nevertheless more closely allied to our interests than might be thought, for, as Madame Chiang says in the concluding paragraph of her book: "To my mind our destiny is with the democracies, because our people are inherently democratic in nature and spirit. If we survive we have the opportunity to become a great organized democracy. That is, of course, if democracy itself survives the world." China's earnest national hope is that when the smoke of battle has cleared away the democracies will see to it that there are no spoils of war or fruits of victory for invader and aggressor nations.

This whole book is permeated with noble thoughts, clever and unwarped, without any whining.

Notes on Books

SUTTON'S *Diseases of the Skin*, one of the larger, weightier, and undoubtedly one of the most successful of the American textbooks of dermatology, has now reached its tenth edition (Henry Kimpton, two volumes, 70s.). The younger Richard Sutton now shares the honours of the title-page with his father. This textbook has always been distinguished for the fullness of the references and the thoroughness with which the authors have gathered in every skin disease known to or imagined by the profession. Nevertheless they manage to confine the two volumes within reasonable limits, and they are not too heavy to handle. An aetiological classification is now adopted, and consequently the arrangement of the text differs a good deal from that of the ninth edition. Illustrations have always been a feature, and those in the edition before us are well up to standard. There are 1,452 in the text and twenty coloured plates. We have no doubt that the American medical public will appreciate the industry and learning embodied herein.

A little book, *Roller and Triangular Bandaging Illustrated*, by Miss MARY FARNWORTH, S.R.N., is published at 3s. 6d. by Faber and Faber. This is one of the best of its kind that we have seen, its chief merits being the line and wash drawings by Mary Ruddick illustrating the methods of application, and the absence of unnecessarily long text descriptions. The best way to learn bandaging, like the best way to learn knots and knot-tying, is from verbal instruction in a practical class, but where this is difficult to obtain the present book will prove a valuable aid. The last part of the book deals with the making and use of special bandages such as the many-tail and those for plaster-of-Paris work, and will be of value to workers in hospital.

The issue of the fourteenth edition of *Stedman's Practical Medical Dictionary* (London, Baillière, Tindall and Cox, 37s. 6d.), which appears three years after publication of the thirteenth edition, marks the passing of its founder and editor, Dr. Thomas Lathrop Stedman, at the age of 84. Up to the time of his death he was actively engaged in the work of preparing this latest revision, much of which he had already accomplished. The responsibility of editorship has been taken over by Dr. Stanley Thomas Garber, his nephew, who had recently been collaborating with him. The new issue contains numerous fresh items, including many concerning recently isolated hormones, vitamins, and chemical compounds of therapeutic value. Two colour plates have been added, and a reproduction of the Oath of Hippocrates appears as a frontispiece. Those who have need of a medical work of reference will find that *Stedman's* continues to provide information that is both up to date and easy of access.

The 1940 edition of the *South and East African Yearbook and Guide* is published by the Union Castle Mail Steamship Company, Ltd., 3, Fenchurch Street, London, E.C.3, at 2s. 6d. (3s. by post in the United Kingdom; 3s. 6d. elsewhere). Some thousands of amendments have been made to the matter and figures published in 1939. The guide contains 1,164 pages of text and includes an atlas by John Bartholomew and Sons of sixty-four pages of maps in colour, and in the text there are twenty-six plans of the principal towns, ports, etc.

Preparations and Appliances

UTERINE DRAIN AND DILATOR

DAME LOUISE MCILROY has designed a rubber drain in place of the rigid stem pessary made of vulcanite or glass, which is not always satisfactory. The drain is self-retaining by means of the slit end, and the rubber disk prevents its com-

plete insertion into the uterus. The stem is hollow, and it can be introduced by means of a sound or probe placed in one of the slits and the rubber head stretched lengthwise. It is useful in cases of stenosis of the cervix after instrumental dilatation for dysmenorrhoea, and in cases of uterine discharge or septic abortion. The rubber adapts itself to the movements of the uterus. The instrument has been made by Messrs. Allen and Hanburys Ltd., 48, Wigmore Street, London, W.1.

SOBISMINOL

We have received from Messrs. Eli Lilly and Co. samples of Pulvules Sobisminol Mass and Solution Sobisminol Lilly.

Sobisminol mass is a water-soluble bismuth compound which was discovered by Hanzlik; it is described as being formed by the interaction of sodium bismuthate, tri-isopropanolamine, and propylene glycol. In the solution this mass is dissolved in a mixture of propylene glycol and water. These preparations were accepted by the Council of Pharmacy and Chemistry of the American Medical Association in December, 1939. Reports on these products recently appeared in the *Journal of the American Medical Association* (1939, **113**, 2214, 2235, and 2240); these indicate that sobisminol mass when administered orally produces therapeutic effects in syphilis comparable to those produced by intramuscular injections of bismuth. This preparation promises, therefore, to be of great importance in the treatment of syphilis. Solution sobisminol is provided for those who prefer to give the drug by intramuscular injection.

The researches of Hanzlik and his co-workers have indicated that if bismuth therapy is to be of definite anti-syphilitic value it must be intense enough to cause a daily urinary secretion of from 3 to 5 mgm. per 100 c.c. urine. Messrs. Eli Lilly have prepared bismuth excretion test tablets which provide a rapid and reliable method for estimating the concentration of bismuth in the urine.

BRITISH MEDICAL JOURNAL

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GAS GANGRENE

The letter we published last week (p. 411) from C. Max Page, now consulting surgeon to the B.E.F., drew attention to a subject that must be expected to grow in importance in the near future—namely, the diagnosis and treatment of gas gangrene. In 1917 the pathological changes occurring in muscle as a result of infection by anaerobic gas-forming organisms and the mode of spread of the infection were described by McNee and Shaw Dunn in an article in this *Journal*.[1] In the same issue Cuthbert Wallace gave an account of the morbid anatomy of the condition together with the colour changes in skin and muscle.[2] These two articles and the work which preceded them completed the clinical and pathological picture of the disease as seen at that time; and, in addition, the more intimate knowledge of the types of infection and the mode of spread led to a modification and improvement in methods of treatment. It was found that infections localized to a muscle or group of muscles could be arrested by local excision of the affected area, and a report on a series of cases treated in this way was published simultaneously with the two articles mentioned.[3] It was concluded as a result of this work that the best line of treatment consisted in effective débridement of the wound with removal of all muscle which was non-contractile, showed colour changes, and failed to bleed on section. Simple drainage, continuous irrigation, and the use of hydrogen peroxide injections were abandoned in favour of clean excision with a view to delayed primary or secondary suture of the wound. The results of this line of treatment were definitely satisfactory, and the general application of early and radical débridement in all wounds minimized infections and saved many limbs. In the last few years other methods of treatment and diagnosis have been evolved, and it is of importance to evaluate them and to consider how far they modify or supplant those employed twenty years ago. The methods under consideration are those involving the use of sera, of drugs, and of *x* rays, and these will be discussed in turn.

Anti-gas-gangrene serum was given prophylactically during the later months of the last war, but little or no advantage could be ascribed to it. Since then, with better methods of preparation, sera have been made available for both prophylaxis and treatment with a view to protection against *B. perfringens* and *Vibrion septique* infections. As an adjuvant, sera probably have some value in limiting the spread of infections and possibly may have some prophylactic value, but in either case proof is difficult to obtain and treatment by sera cannot in any way lessen the necessity for adequate surgical intervention.

Drugs of the sulphonamide group, given in large doses, are certainly of much help in combating gas gangrene infections; but, in the main, successful results seem to have been obtained in relatively superficial injuries—namely, lacerations of soft parts or compound fractures with wide open wounds. Observations in industrial and mining areas show that ordinary septic infections in compound fractures are apparently diminished in frequency when a sulphonamide is used, and, as the drug is known to have an effect where gas-forming organisms are present, it is almost certainly of value in prophylaxis against this type of infection. The effect of a sulphonamide on the closed type of infection such as is produced by a shell fragment with a small wound of entry only is problematical. In such wounds the onset of infection is very acute, at times being evident within three to four hours; vascular obstruction occurs early owing to swelling, and massive gangrene of muscle supervenes with great rapidity. It is difficult to see how the drug can reach the affected area, and it can certainly do no good when muscle is already extensively devitalized. It may, however, prevent further spread and diminish or overcome a blood stream infection, and should undoubtedly be used for this reason.

X rays have been advocated both for diagnosis and for treatment of anaerobic infections. The fact that gas bubbles or pockets in the tissues can be visualized by *x* rays has long been known, and the presence of such bubbles was noted in *x*-ray plates of injured limbs in many cases during the last war, but the significance and possible value of the observation were not fully realized at the time. In the field, for diagnosis in early cases, this method is not likely to be necessary, because the clinical signs are sufficiently clear: to use the method to elicit the extent of the infection is fallacious, for gas bubbles may be, and often are, present at a very considerable distance from the site of infection, having travelled along the fascial planes. The presence of gas in the subcutaneous tissue at a distance from the wound does not necessarily mean that this area is heavily infected or indeed infected at all. Many amputations through the thigh were carried out with success for gas gangrene of the leg in which the flaps were fashioned from skin in which subcutaneous crackling could be felt. For the diagnosis of the late onset of an anaerobic infection, after the wound has been operated on, the method is clearly of value, as also for eliciting the presence of a low-grade infection or one of a localized type—that is, round a retained projectile. Intensive *x*-ray therapy as a curative measure can have little or no place in war surgery: the massive types of gangrene are clearly not curable by irradiation and the localized infections are known to respond favourably to surgical treatment by débridement. As the sole method of treatment available, apart from drugs, in retroperitoneal infections it is worthy of a trial.

[1] McNee, J. W., and Dunn, J. Shaw. The Method of Spread of Gas Gangrene into Living Muscle. (1917.) *British Medical Journal*, **1**, 727.

[2] Wallace, Cuthbert. The Colour Changes Seen in Skin and Muscle in Gas Gangrene. Ibid., 725.

[3] Frankau, C. H. S., Drummond, Hamilton, and Neligan, G. E. The Successful Conservative Treatment of Early Gas Gangrene in Limbs by the Resection of Infected Muscles. Ibid., 729.

To summarize: Diagnosis can be made on clinical grounds alone; *x* rays are not needed as a rule but may assist in late or latent cases. Treatment depends on the nature and extent of the infection. In limbs amputation alone can save life in massive infections; localized infections can be arrested by effective débridement and muscle excision. Serum therapy must still be regarded as being on trial; it may minimize the risk of infection and limit its spread. Sulphonamide has a very definite value both as a prophylactic and as a second line of defence after surgical treatment. Except in superficial infections it cannot replace surgery. *X*-ray therapy can have little or no place under war conditions.

MEDICAL EDUCATION IN THE U.S.A.

The most conspicuous of the many services which the American Medical Association, since it was reorganized and made more comprehensive in 1901, has rendered to the profession and public of the United States has been its initiation of, and participation in, inquiries into the standards and methods of medical schools in that country with the object of raising the level of medical education therein. There have now been three or four extensive and specific surveys, apart from the continuous process of encouragement and help which is exercised by the Association's Council on Medical Education and Hospitals. Perhaps the most striking of these surveys was that conducted by Abraham Flexner in the years 1909 and 1910. His report disclosed widespread and astonishing deficiencies and showed that the United States of America lagged far behind Europe in this field. As a result many of the weaker schools closed; others gained strength through university affiliation, private endowment, or State support. Later, especially at the time of the post-war depression, inquiries showed the need for a complete review of the situation. Such review was authorized in 1933 and was undertaken by Dr. Weiskotten, dean of the Syracuse University College of Medicine, on behalf of the Council, during the academic years 1934–6. Eighty-nine schools were visited by Dr. Weiskotten and his colleagues; but of these ten were in Canada (included at their own request), two were unapproved schools, ten were schools of the basic sciences only, and one was a recently established school for postgraduates only. The report, a most able, comprehensive, and valuable document, has now been published by the A.M.A.,[1] and it will be seen that it is really concerned with the sixty-six recognized American schools which give the full four-year course of study. A list of these is given, but in assessing their several grades of efficiency or deficiency, whether in general or in regard to specific departments, no names are stated. The method of inquiry is set out, and it is clear that these assessments have been carefully made after adequate investigation and full consideration. There are many statistical tables, but it is pointed out that it is not by statistics merely, or even mainly, that schools have been judged.

Careful study of the report justifies three general findings. First, the cost of medical education is higher than the cost of any other department of university education, the instructional cost per student on a credit-hour basis being in medicine $26.96, in dentistry $15.87, in agriculture $14.51, in law $11.05, in engineering $10.52, in commerce $5.92, and in teaching $4.06. Secondly, there has been a continued and considerable improvement in many respects since the last review, especially perhaps in regard to scientific research and library equipment. Thirdly, there is still an enormous and lamentable variety in the efficiency of the schools, a large proportion being below any standard which can be regarded as satisfactory. The impression produced on the mind of at any rate one reader is that only ten, or possibly fifteen, of the sixty-six schools really reach such a standard, though in one or two particular departments or provisions some of the others may be relatively good. A comparison between one of the best and one of the worst is graphically drawn in the report itself, and the latter has a considerably greater number of students than the former. Let it be conceded, very willingly, that the best schools are very good, but there is clearly no room for complacency. The attention of the American reader may well be occupied largely with this aspect of the report, and it will be interesting to observe how far the withdrawal of recognition from some schools, and to what extent the placing on probation of others, is now carried. It should be drastic. To take one criterion only, the average number of hospital beds available for teaching in the lowest-ranking schools is two per student in the clinical years.

The report contains the statement that "in the field of education American medicine has won for itself a place of unquestioned pre-eminence." If this refers to undergraduate education it can scarcely be accepted by British observers. In Great Britain and Ireland there are almost exactly half the number of schools recognized by the General Medical Council as compared with those recognized in America as stated above. Under a most rigorous "visitation" and severe report on behalf of the G.M.C. it is possible that three of these might be regarded as, on the whole, of not quite "sufficient" standard. It is probably not in dispute that the best in England and Scotland will compare favourably with the best in the United States, so that viewing the whole field of medical undergraduate education broadly, and in face of the report now under review, the justification for any claim of American "pre-eminence" is far from obvious. Apart, however, from any rivalry in general efficiency, the British reader will be mainly interested in certain well-marked differences in educational conditions and methods which the report brings out.

It is likely that America has somewhat the advantage in the quality of the student entering upon, and continuing in, the medical course in many of the schools. Circumstances there allow of a more rigorous and more careful selection of the applicants; and a higher standard of pre-medical education than the prescribed

[1] *Medical Education in the United States, 1934–1939.* (Pp. 260.) Chicago: American Medical Association.

minimum in this country can be enforced. The medical course proper, however, is one of only four years instead of five; there are only two clinical years instead of three as here. Some compensation for this is the increasing insistence on some period of "internship" on completion of the course before a qualification to practise quite independently is conferred. One consequence is that the basic science courses of the first two years are curtailed, concentrated, or crowded. The anatomy course never extends beyond the first year, and is often of two terms only. The physiology course tends to be somewhat longer, but never goes beyond the middle of the second year. Into the first year come the whole of the courses on histology, embryology, and biochemistry; into the second year those of pharmacology, bacteriology, and pathology, together with instruction in the methods of clinical and laboratory diagnosis. Some definite merits are claimed for this system, but it must often lend itself to superficial work. In the clinical years there is little didactic teaching. Clinical clerkships, of short duration, both in medicine and in surgery, are usually insisted upon in the third year, and attendance at out-patient departments postponed till the fourth. Usually there is no experience in administering anaesthetics, and attendance on operations is not required. Opportunities for obstetrical experience are almost universally meagre. Only twenty-three departments offered opportunity to deliver women in hospital, and of these sixteen offered not more than four deliveries per student. Most schools have no home midwifery service at all; eighteen provided each student with less than five cases; and in only six departments was there adequate provision for the supervision of student deliveries. About half the schools in Great Britain and Ireland find it difficult or impossible to provide the larger number of midwifery cases required by the G.M.C. regulations; if the situation here is regarded as unsatisfactory or serious, that in the United States must be desperate and dangerous indeed. Forensic medicine is taught only occasionally, and the teaching of clinical specialties to the undergraduate is so perfunctory that there is said to be "such neglect that some recent graduates find themselves unable to make a complete examination of a patient or to determine for themselves whether or not he should be referred to a specialist."

It is clear that all interested in medical education ought to study this interesting and instructive report, and that there is still much to learn on each side of the North Atlantic Ocean.

MEDICAL USES OF RADIUM

Once again the clinical and experimental work carried out by the various centres which have radium on loan from the Medical Research Council has been summarized and published.[1] So far as the statistical section of the report goes we venture one or two suggestions and criticisms. For instance, the material supplied by the centres probably does not permit of the calculation of absolute survival rates, but the value of the report would certainly be increased by the inclusion of relative survival rates. The division of patients treated as far back as 1925 into "living" and "dead" is obviously valueless, as a patient who was aged 65 in 1925 might quite well be dead, cancer or no cancer, fourteen years later. There appear to be records of some 2,800 cases of cancer of the breast and 3,700 cases of cancer of the cervix, and it is clearly desirable that the Council should make full use of this material, both by obtaining uniformity of reporting from the various centres and by presenting the results in appropriate form. It might be better if this statistical section were combined with the Radium Commission report, since there is considerable overlap, and large centres which do not at present co-operate might well be encouraged to do so. The section on teleradium therapy is of particular interest for the observations on the over-all time of treatment. At the Radium Beam Therapy Research a tumour dose of 6,000 *r* or more in forty-two days is the rule, but at the Middlesex Hospital the majority of cases treated in this way showed a few months later a leathery skin, a woody induration of the subcutaneous tissues, and a persistent oedema of the mucosa. The treatment has therefore been modified to a tumour dose of 5,000 *r* in thirty-five days or less, with interstitial irradiation in addition if necessary. The Radium Beam Therapy Research also reports the start of an investigation into treatment in a parallel series of cases with the teleradium unit and with 200 kV *x* rays, the treatment being identical in all cases except for the wave-length. The results of this experiment will be awaited with the greatest interest. The experimental section also deals with the wave-length question, and the conclusions of the workers at the Strangeways Laboratory on this problem and on the intensity factor, which may soon be expected, will be of the greatest value to radiotherapists. Of equal importance in the technique of radiotherapy is Dr. Mayneord's work on depth dosage and the volume distribution of radiation. Fundamental research on the properties of neutrons is also reported, and there will be special welcome for the decision to provide a cyclotron for biological research "with a view to the possibility of establishing a scientific basis of treatment by neutron irradiation."

[1] Medical Research Council, Special Report No. 236, *Medical Uses of Radium*: Summary of Reports from Research Centres for 1938. H.M. Stationery Office (price 1s., postage extra).

THE AETIOLOGY OF EPILEPSY

Investigators into the cause of epilepsy regard the fit itself as a symptom, and they pay less attention to it than they do to the abnormalities which can be found when the patient is clinically normal, between seizures. They visualize a basic abnormality which is present throughout life and lowers the convulsive threshold of the nervous system in potentially epileptic subjects.. The precipitating cause of the fit itself is quite unrelated to the fundamental biochemical abnormality, and, indeed, the only common factor found in the diverse causes of epilepsy is that they all fire off a convulsion in a predisposed subject. In some the epileptic predisposition is great, as in the "idiopathic" epileptic, and in others slight, as in the elderly patient in whom a cerebral tumour is the explosive agent. This conception of epilepsy is being substantiated by many workers in America, and in particular by the electro-encephalographic and biochemical findings of Lennox, Gibbs, and their colleagues. Aird and Gurchot[1] showed recently that injections of cholesterol protected against experimental convulsions in animals, and they think that epilepsy is closely related to a disturbance in the

[1] *Arch. Neurol. Psychiat.*, Chicago, 1939, **42**, 491.

metabolism of the vital lipids cholesterol and lecithin. As Cobb, Cohen, and Ney[2] had found that a supra-vital dye, brilliant vital red, protected against convulsions, Aird[3] has been studying the mode of action of this dye. In common with the drug sodium diphenyl hydantoinate the dye has an anti-convulsant effect without any sedative action. Williams[4] pointed out that herein lay a fundamental difference from all the other therapeutic anti-convulsants, suggesting a change in the basic epileptic state rather than a depression of the convulsive process itself. Aird concluded that brilliant vital red affords protection against experimental fits by rendering the haemato-encephalic barrier (that peculiar mechanism which causes selective absorption of blood constituents into the central nervous system) relatively impermeable to the passage of convulsive agents. It is significant that many of the precipitating factors in epilepsy cause a change in the permeability of endothelial surfaces. For example, the toxaemias, the premenstrual and menstrual periods in the female, allergy, and experimental hydraemia are all associated with convulsions. Similarly, it has been found that the function of the "barrier" is impaired by injuries and tumours of the brain. If such a mechanism is at work in epilepsy it is probable that the abnormality is even more widespread than this, for Spiegel and Spiegel-Adolf[5] have shown that conditions which favour the production of seizures are associated with an increase in the permeability of cortical tissue, and it may well be that the fundamental abnormality lies in the cell membrane of the neurones themselves. Given such an abnormality the cell is more susceptible to whatever convulsive agents may chance to be present, so that epilepsy has become to the casual observer not a syndrome based on a single biochemical abnormality but the result of diverse and apparently unrelated causes.

MATERNAL AGE AND PARITY IN PLACENTA PRAEVIA

It is well known that there is an association between multiparity and the occurrence of placenta praevia. In practice, however, it is difficult to distinguish between the effect of the birth order of the child and another factor—the age of the mother—because these variables are so closely associated. L. S. Penrose, in a valuable study which clarifies the whole subject,[6] found that a distinction could be drawn between the central type on the one hand and the lateral and marginal types on the other. The central cases numbered thirty-five, but were sufficient to show that advancing maternal age is a highly important factor. In another more general paper Penrose[7] gives figures which illustrate very clearly the magnitude of the effect. A comparison of the incidence of central placenta praevia in mothers of different age groups shows that the chance of women of the group 21 to 25 exhibiting the condition is about one-third of the chance of mothers of all ages; as maternal age advances so does the incidence of the abnormality, until in the maternal age group 46 to 50 it is about eight times as great as in mothers of all ages. This implies a definite and considerable association, but it is much smaller than in the case of mongolism, for which comparable figures are given. The chance of a mother of 21 to 25 having a mongol child is about one-fifth of that of mothers of all ages, and the steady increase with increasing maternal age is so pronounced that mothers of 46 to 50 are forty-four times as likely to have a mongol child as the average mother in a maternity hospital. The relative effects of maternal age and parity have been examined by a technique of partial regression, and it was found that, compared with the effect of maternal age, that of birth order is so small that it cannot be regarded as of appreciable aetiological significance. It is maternal age, therefore, which is important, and the apparent effect of birth order is simply due to the fact that it depends so largely upon maternal age. Lateral and marginal cases also revealed some association, but it was far smaller than in the central cases. Furthermore, it was not possible in this instance to determine whether maternal age or parity was the more important factor. A separation of the lateral and marginal cases did not show any difference between the two sets of figures. Examination of the data as a whole did not show that the interval between the abnormal pregnancy and the preceding one was unduly short in comparison with the other pregnancy intervals in the same families, so that there was no evidence that too short an interval may be a predisposing factor.

[2] *J. nerv. ment. Dis.*, 1937, **85**, 438.
[3] *Arch. Neurol. Psychiat.*, Chicago, 1939, **42**, 700.
[4] *Lancet*, 1939, **2**, 678.
[5] *Proc. Soc. exp. Biol. N.Y.*, 1936, **34**, 799.
[6] *J. Obstet. Gynaec. Brit. Emp.*, 1939, **46**, 645.
[7] *J. ment. Sci.*, 1939, **85**, 1141.

TUBERCULOSIS EPIDEMIC OF BOVINE ORIGIN

For various reasons tuberculosis of bovine origin either is or appears to be sporadic in its incidence. Outbreaks of multiple cases at about the same time in the same neighbourhood are so uncommon that when they do happen they attract unusual attention. A particularly interesting outbreak of this type is recorded by Gnosspelius[1] in Sweden. In July, 1938, cases of erythema nodosum and of cervical adenitis began to occur in different parts of Gothenburg. By a fortunate accident it was learnt that the affected children were receiving raw milk from the same source, and examination of the herd, which was owned by a producer-retailer, showed it to be heavily infected with tuberculosis. A complete list was obtained of the 136 persons in the thirty-three families to whom this milk was delivered. Tuberculin reactions were carried out on 100 of them, and ninety-eight were found to react positively; the two negative reactors were breast-fed infants. From inquiry it seemed probable that at least twenty-three of the ninety-eight reactors had been infected from the milk; two of them had erythema nodosum and seven had enlarged cervical glands. The bovine type of bacillus was demonstrated in two patients who were examined. What adds to the interest of the story is that at about the same time as the outbreak in Gothenburg cases of non-pulmonary tuberculosis were cropping up in a summer home in the country to which weakly children were sent. The home contained forty-two children, aged 6 to 13 years, fifteen of whom were tuberculin-positive on arrival. After being in the home for about five weeks a large number of the children became ill and febrile. Headache, pains in the neck, and vague abdominal symptoms were common. Sometimes the fever disappeared in a day or two, and usually it was over within a week. The whole outbreak looked like some relatively unimportant alimentary infection. A week or two later, however, after the home had broken up, there were three cases of erythema nodosum among children who had returned to town. Examination of the other children who had been ill showed later that there was one other case of erythema nodosum and four of cervical adenitis. The cases were confined to children who had been tuberculin-negative on entering the home, all of whom had now become positive reactors. There

[1] *Acta paediatr.*, Stockh., 1939, **26**, 194.

was little doubt, therefore, that the children had been infected with tuberculosis in the home, and this was confirmed when it was found that the milk supplied to the home came from the same source as that which had been responsible for the outbreak in Gothenburg itself. It is not often that milk-borne tuberculosis can be traced to its origin so clearly. Occurrences of this sort should, happily, become fewer in Sweden, since compulsory pasteurization of all milk in towns, with the exception of milk from non-reacting herds, came into force on July 1, 1939. In country districts, however, the law does not hold, and there may still be a danger of town-bred children, who have been used to receiving a safe milk supply, becoming infected when on holiday in the country. The protection of such children is a problem that not only confronts Sweden but is of special interest in Great Britain, where large numbers of children in the reception areas are now being exposed for the first time to the dangers of infected raw milk.

THE REHABILITATION OF PROSTITUTES

The League of Nations, which has done such admirable work on social questions, has conducted an inquiry into the rehabilitation of prostitutes. Two parts of the report have already appeared, and the third and fourth parts have now been published together under the title "Methods of Rehabilitation of Adult Prostitutes."[1] The information was collected by means of two questionaries sent out to Governments and voluntary organizations. In many countries the police and their welfare workers direct prostitutes who ask for assistance to suitable agencies and institutions. Much of the value of this official action lies in its wide range. Voluntary societies often carry on active propaganda, and voluntary workers visit the places where prostitutes are likely to be found—for example, police stations, venereal disease clinics, their houses, and even the streets. On the whole the authorities are satisfied that these measures of publicity attain their end, and that most prostitutes know where to apply if they wish to give up their mode of life. Probably, however, only the minority take the initiative themselves. The service must seek out the woman and attempt to arouse within her the wish for another type of life with a promise of assistance, equipment, care, and placement. For most women training in an institution is thought to be the best form of re-education. Opinions differ on the character of the ideal institution. The real problem is to combine discipline and liberty so as to make the institution attractive enough for adult prostitutes to enter it voluntarily and to stay there until the end of their training. The solution may be found in a combination of discipline during working and educational hours with comparative freedom outside those hours. Nearly all authorities are in favour of making the homes less conventional and the lack of liberty less acute. The committee concludes that special rehabilitation services can only be built successfully on a basis of wider social measures, such as repression of brothels and insurance against unemployment and ill-health. Many more women have abandoned prostitution of their own accord through good social services and an educated public opinion than have abandoned it with the assistance of a special home. Means of assistance should be made known and offered early. Fines or short sentences of imprisonment are useless from any point of view; it is much better to put a prostitute on probation under the care of an agency or to send her to an institution. Knowledge of psychological problems, mental deficiency, and delinquency is indispensable to rehabilitants. Social assistance may be advantageously combined with the treatment of venereal disease. Help is more likely to succeed if mental abnormality is treated. As in most other social enterprises, the character and personality of the worker are all-important. After-care needs much intelligence and discretion. Finally, attempts at rehabilitation must be supplemented by preventive action, which is easier, more lasting, and wider in application.

[1] Series of League of Nations Publications. IV Social. 1939.IV.4. (3s. 6d.)

ORAL TREATMENT OF SYPHILIS

We have received samples of "sobisminol mass," a notice of which appears elsewhere in our columns. This substance, which promises to become an important therapeutic agent, has the following history. In 1933 Hanzlik began a search for a preparation of bismuth suitable for administration by mouth. In 1936 he obtained a patent for sobisminol, which is a soluble product of sodium bismuthate and propylene glycol. The patent was assigned to the Board of Trustees of the Standard University of California, and three firms have been licensed for its manufacture. The therapeutic properties of this compound were tested carefully, and it was proved that a satisfactory absorption of bismuth occurred after its oral administration and that the therapeutic effects were comparable to those produced by intramuscular injections of bismuth. Furthermore, careful studies were made to eliminate the possibility of the propylene glycol leading to toxic symptoms. The preparation was accepted by the Council of Pharmacy and Chemistry of the American Medical Association last December,[1] and favourable accounts have been published of its clinical actions.[2] The introduction of a drug which, when taken by mouth, will alleviate or suppress the signs and symptoms of syphilis is associated with certain obvious dangers, and these have been pointed out clearly by the *Journal of the American Medical Association*.[3] The unrestricted sale of sobisminol to the public would be a real danger and detrimental to public health, since it would encourage self-medication, and the consequent inadequate treatment of syphilis would certainly favour the spread of this disease. The control of the preparation, which has been retained by means of patent rights, should act as a safeguard against this danger.

We regret to announce the death of Dr. A. J. R. O'Brien, C.M.G., chief medical adviser to the Secretary of State for the Colonies during the past two years, and formerly medical secretary to the Colonial Advisory Medical Committee.

News has been received from New Delhi of the death of Major-General G. G. Tabuteau, A.M.S., who had been Director of Medical Services in India since 1937, and honorary surgeon to the King and to the Viceroy.

[1] Council Report (1939). *J. Amer. med. Ass.*, **113**, 2235.
[2] Meninger, W. M., and Barnett, C. W. (1939). Ibid., 2214.
[3] Editorial (1939). Ibid., 2240.

The Ministry of Health memorandum on cerebrospinal fever (234/Med.), to which full reference was made in a leading article last week at page 396, has been issued by the Ministry to all medical officers of health, and is now published by H.M. Stationery Office, price 2d. The memorandum summarizes briefly the modern views on treatment of cerebrospinal fever, and includes observations on the epidemiology of the disease, the part played by the healthy "carrier" in its spread, the control of contacts, diagnosis, and the general measures of prevention.

SURGICAL PROBLEMS OF WAR

This contribution is the third of four articles written by a Canadian surgeon who had considerable experience of war surgery in 1914–18

HEAD WOUNDS: AMPUTATIONS

BY

AMBROSE L. LOCKWOOD, D.S.O., *M.C.*

Head Wounds

The whole problem of gunshot wounds of the head was simplified when the necessity for and possibility of early operation were recognized. It was especially important to deal with such wounds before deep-seated infection in the substance of the brain was established and while it was possible to carry out total excision of the scalp wound and immediate suture. The important points in surgery of gunshot wounds of the head are:

1. The earliest possible evacuation to the casualty clearing station.

2. Accurate location of the missile, if retained, and determination of the extent of the fracture and position of bone fragments that may have been carried in. In addition, to ascertain whether there is a fracture of the base, with bleeding from the ear, or of the frontal plate, with escape of cerebrospinal fluid from the nose, and whether the lateral and longitudinal sinuses are involved.

3. A select anaesthesia, preferably local, and sufficient pre-operative sedation or intravenous hypnosis to allay nervous irritability and excitement.

4. Total excision of the wound of the scalp down to the bone.

5. Thorough cleansing of the exposed bone with a non-irritating antiseptic, and excision of enough bone to expose a quarter of an inch of healthy dura about the track of the missile through the dura *and no more.* This is particularly important if the dreadful hernia cerebri that occurred in nearly all gunshot wounds of the head operated upon at certain base hospitals is to be avoided.

6. Excision of the frayed devitalized track of the missile through the dura, *but no more.*

7. Careful irrigation with saline, and suction of the tract to clear out all foreign matter, disorganized and destroyed brain tissue, and blood clot; and, only then, careful exploration for the retained missile or fragment of bone. A catheter is best for this purpose, but occasionally a finger can be safely passed along the track.

8. If there is no penetration of the dura, but if there is an area that is dark, lustrous, boggy, non-pulsatile, and with disorganized brain matter and blood clot underlying it, do not hesitate to make a short stellate incision and carefully tease out all clot and broken-down brain matter, irrigate gently with saline, and, if possible, lightly resuture the dura, otherwise leave it open. Opening of the dura in such wounds is important. I have had patients who during operation under local anaesthesia became conscious almost at once. In addition the prolonged headache and stupor that persisted when the dura was not opened were almost entirely avoided, as was the danger of retained blood clot with the development of an organized haematoma that often undergoes cystic degeneration, with all the grave sequelae that brain surgeons have come to recognize after civilian injuries to the skull and that too often are overlooked. Rigid asepsis must, however, be maintained.

9. After removal of the missile and all other foreign matter, primary suture of the scalp wound—without drainage if dealt with early enough, otherwise leaving a small Penrose drain in a dependent position down just to the dura for forty-eight hours. Any wound of the scalp can be closed by a reversed "S" (2) incision; all other methods to ensure closure of the scalp, such as lateral incisions, undue freeing of the scalp, bevelling incisions, etc., should be abandoned. It is important to realize the value of such a closure.

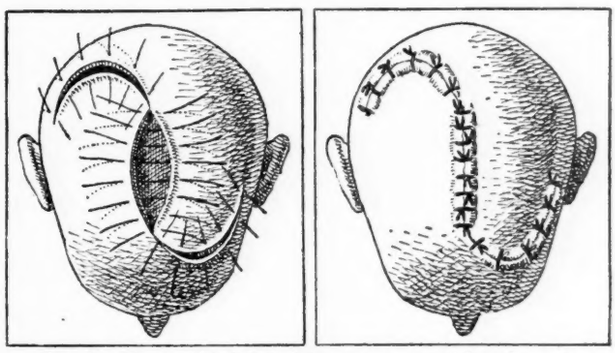

FIG. 1.—Reversed "S" incision to ensure sliding flaps that may be best employed to close any gaping wound of the scalp.

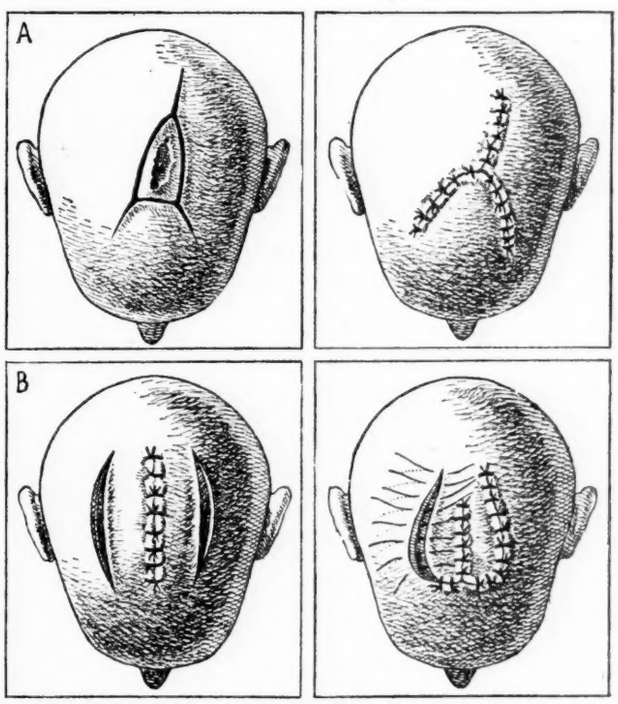

FIG. 2.—A. "Isle of Man" incision for wide "V" wound. B. Undercutting incisions to permit closure of wounds: both are bad.

10. If there is a rent with loss of tissue in the longitudinal sinus, the lateral sinuses, or even in the torcular Herophili, use a postage-stamp patch of the thinnest of epicranial tissue or of fascia lata if available, but do not pack with gauze or plug with muscle. Cut the thinnest possible patch of epicranial tissue or of fascia lata, preferably the former, and merely appose it over the hole in the sinus. Hold it gently with a finger for one minute. It adheres and is held by cohesion, the circulation is re-established, and after two or three minutes such a patch can only with difficulty be removed. We have reorganized almost an entire torcular Herophili

by such a method, requiring two or three such patches. It is important to maintain the circulation in the sinuses. Periodic lumbar punctures with withdrawal of varying quantities of spinal fluid, depending on the pressure of the fluid, may be necessary for a few days following operation, and particularly after late operation with infection and extensive loss of bone, when there is a greater tendency to hernia cerebri.

11. Head cases should be retained in the unit after operation for some days until the patient is entirely conscious and until all possible early complications have been avoided or have subsided.

12. It must be particularly kept in mind that the surgeon who can proclaim that a gunshot wound of the head is hopeless or foretell the course such a case may take has himself not dealt with enough cases. Extensive fractures involving the base of the skull, and the frontal plate with an opening into the nares, are excepted. In other words, almost regardless of the extent of the injury to the head apart from those two classes of fracture, early operation is indicated. Scarcely any class of surgery is more satisfying to the surgeon or more important in saving life and avoiding later unfortunate sequelae to the wounded than is careful, scrupulous surgical attention in gunshot wounds of the head. The services of a thoroughly experienced neurologist are of inestimable value to patient and surgeon alike, and greatly simplify and facilitate the aid that the surgeon can give to patients with wounds of the head. Such an internist should be attached to every casualty clearing station.

Fractures

Whereas in the last war the Thomas leg and arm splints and various modifications of them were almost universally employed for ensuring fixation and traction, I believe that in this war flexible wire, pins, and other similar things will be commonly used. Equipment that permits of easy and accurate placement of wire and pins has been greatly improved since the last war, and should be available in every casualty clearing station. Parham bands are convenient and are easily adapted in open fractures of the humerus, the femur, and particularly the tibia where a spiral fracture has occurred or where there is a large displaced fragment that may be difficult to hold in position otherwise. Many compound fractures of the humerus and femur particularly can be dealt with by wide excision of the wound, reduction of the fracture, fixation, and primary suture. Our experiences as early as the summer of 1916 demonstrated that when this was possible the injury was converted into a simple type of fracture; weeks, and often months, were saved in convalescence; and painful dressings, prolonged drainage, and, perhaps most important of all, the danger of mixed infection, were avoided. During periods of great stress in the casualty clearing stations such measures may not be justified because of the countless number of life-saving operations that must be undertaken, but in quieter times it should be the aim of the surgeon to convert compound fractures into closed fractures if that can be done, having always in mind the necessity for clearing away all evidence or possibility of gas gangrene from the wound or wounds. The use of plates, metal, or bone should be discouraged.

Amputations

Probably next in importance to the saving of human life in the surgery of a casualty clearing station is the accurate determination whether amputation is necessary or if the limb or limbs can be saved. Unfortunately, huge numbers of wounded constantly pass through a busy casualty clearing station for whom immediate amputation is life-saving and their only chance. Care must be taken, however, to be *always certain* that nothing less is possible. Amputation as a rule is necessary when:

1. There is massive gas gangrene of the limb that can no longer be removed by ablation of muscles.

2. There is destruction of the main artery and nerves.

3. There is a double compound fracture of the same bone of the limb with much soiling and destruction of tissue.

4. There is such extensive compound fracturing and displacement of component bones of a joint that reduction and fixation is impossible and even resection would not ensure a useful limb.

5. There is, in late cases that have lain out for many days, a purulent infection of a joint or muscle planes such that even after free drainage has been established the patient's life is endangered from absorption.

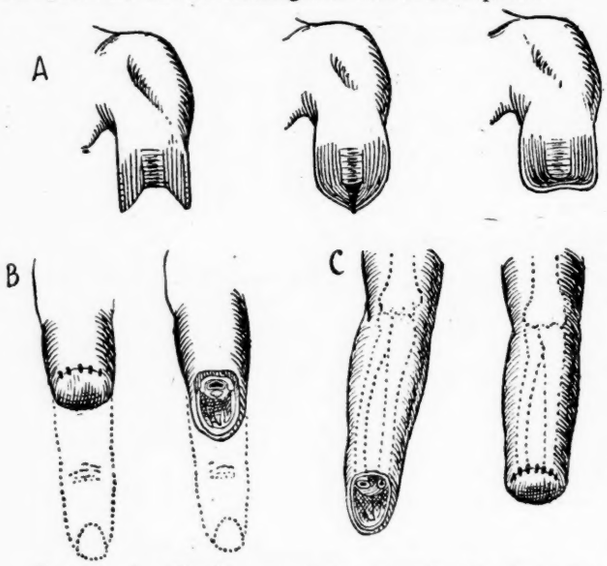

FIG. 3.—A. Circular amputation through the humerus. B. Flap amputation through the finger. C. Flap amputation through the lower arm.

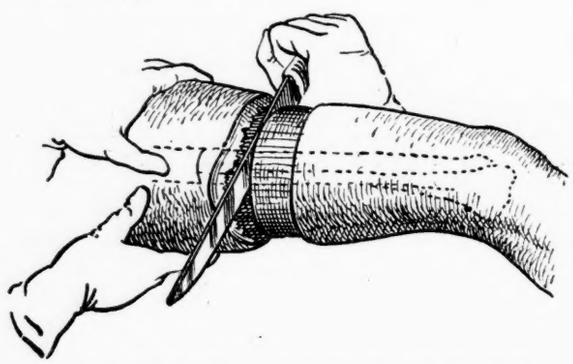

FIG. 4.—Circular flap amputation through the thigh.

Having decided to amputate, every care must be taken (1) to choose the best site; (2) to plan and fashion flaps accurately so as to avoid pressure on the scar later, tension after suture, or indeed a redundant stump; (3) to ligate main arteries securely and to shorten the nerves; (4) to section the bone accurately, not removing too much or too little, or splintering the periphery of the bone; (5) to maintain complete asepsis so far as it is possible; (6) to give close attention to the wound for the ensuing days till danger of sepsis is past. I would draw attention to the value of circular amputation, not flush through the skin, muscle, and bone, but with a cuff of skin, and slightly higher section of the muscles and then of bone so that further surgical intervention is unnecessary other than perhaps skin suture to ensure a good useful limb.

Circular amputation, flush, the so-called guillotine amputation, is rarely warranted for any reason. It leaves an extensive raw surface to dress and necessitates a secondary procedure to close it. A modified circular

amputation as suggested above takes only a few minutes longer to carry out, and in the great majority of cases can be sutured at once or later, and even if left open with traction on the skin will granulate in and heal itself. In addition, it permits as good drainage if lightly packed with gauze.

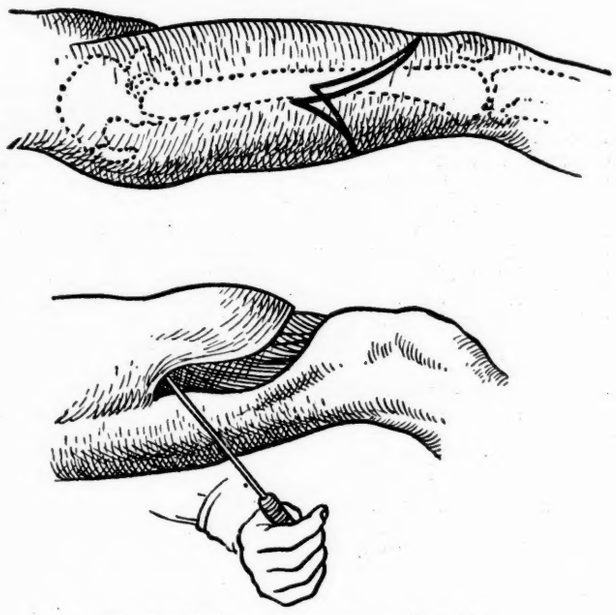

FIG. 5.—Flap amputation through the thigh.

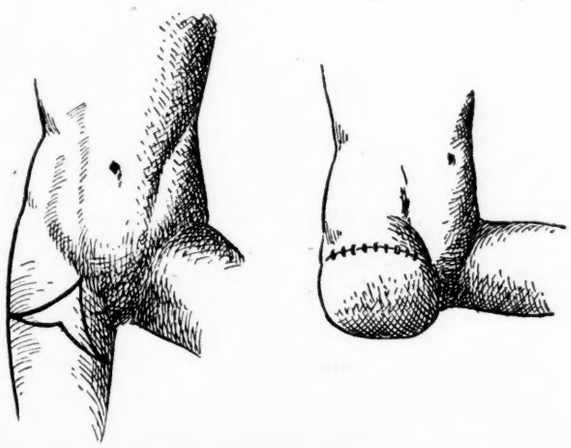

FIG. 6.—Y-flap amputation through the hip.

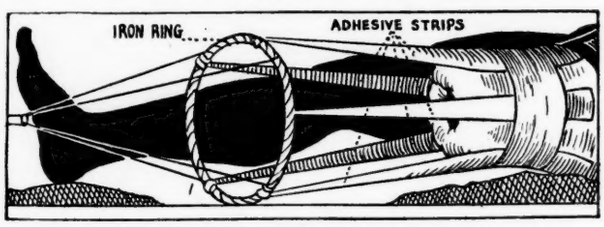

FIG. 7.—Method for preventing or overcoming retraction in circular amputations.

Odier, early in the nineteenth century, first described enlargements or swellings which develop on the distal end of a proximal segment of a peripheral nerve after partial or complete division. Nerves should be gently freed, injected with absolute alcohol for 2 cm., and sectioned just below the injected area. They should not be crushed or ligated. The perineural flap method as suggested by Corner, the swing door or reversed V operation, and crush-and-tie procedure have all been shown by the careful studies of Huber and Lewis not to prevent neuroma formation. In addition, one should not tie a nerve filament in with an artery: it is a direct cause of painful convalescence. It is a wise precaution to leave main arteries long and quickly insert a circular suture in the adjacent muscle and approximate it over the artery so as to avoid secondary haemorrhage.

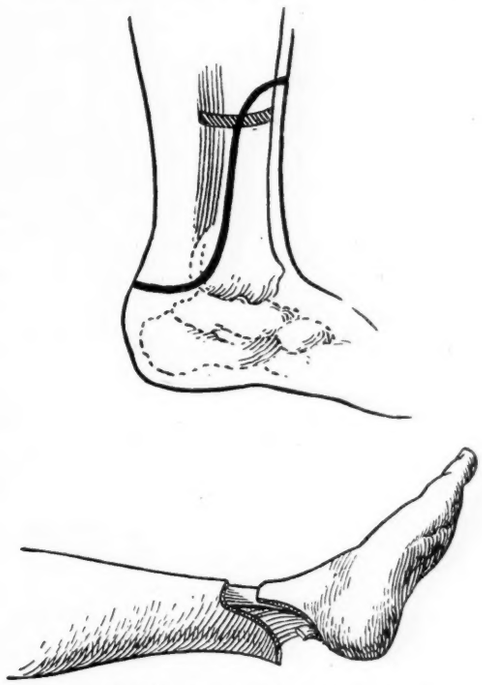

FIG. 8.—Incision for posterior flap amputation.

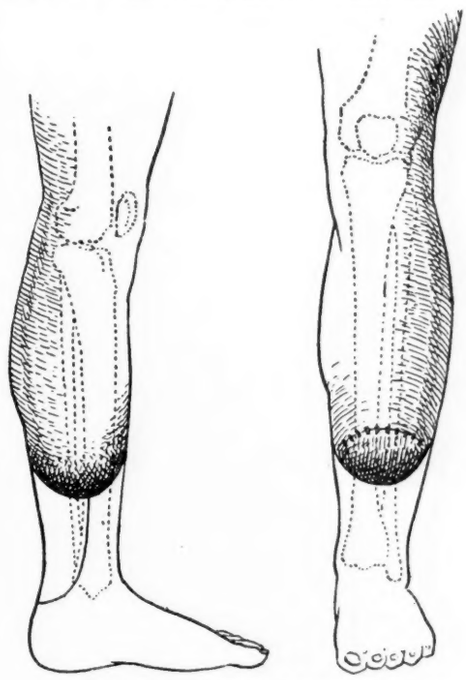

FIG. 9.—Result of posterior flap operation.

While amputations should be elementary in principle, the fact is too often overlooked in practice that every amputation should be planned as a geometrical, mechanical, and anatomic problem. All young surgeons dealing with traumatic surgery should have at hand Farabeuf's great volume, which is ritualistic in its principles of amputation.

PANIC IN WARTIME

BY

Professor M. GREENWOOD, D.Sc., F.R.C.P., F.R.S.

In his last message (*British Medical Journal*, February 17, p. 270) Wilfred Trotter warned us against the dangers of panic thinking. So far as this warning is directed to statesmen and administrators a private citizen can merely note it. Trotter explicitly said that "we should not be concerned in the distribution of blame. There is none to distribute. We have discussed a natural phenomenon and its results." In our attitude towards the Government (and its officials) we may do well to follow the advice of Burke: "I may be unable to lend an helping hand to those who direct the State; but I should be ashamed to make myself one of a noisy multitude to halloo and hearten them into doubtful and dangerous courses." But we can, as private citizens, try to profit from Trotter's teaching in certain ways. That is my excuse for discussing what may well seem a minor evil of war.

Immobilization: Boredom: Crowd Psychology

At the present time thousands of young men and women are immobilized in civil defence and may continue immobilized for months or years. Even if panic estimates were reduced this immobilization must be of wide extent. An assurance company does not merely provide funds to cover average liabilities; it provides a margin. We may be confident that many A.R.P. workers will never give first aid to a wounded civilian or play a hose upon a burning house, however furiously the enemy rages.

The young A.R.P. workers are in a dangerous psychological situation. Their ordinary lives are broken; their work, their education, even their means of amusement are interrupted. The first fine careless rapture of September has faded. Bandaging one another, even pumping water out of a pond, ceases to be exciting after the twentieth repetition. They are becoming visibly bored and there are signs of discouragement. The very same people who six months ago were the most panic-stricken of all are the first to jeer at our expensive precautions. A.R.P. workers, even with the smartest of uniforms, have none of the emotional prestige of the fighting services. So we have boredom and incipient discontent—a wholly favourable soil for the cultivation of psychological crowd disease. The clinical forms may be various: odd rumours of the machinations of spies (we remember the gun emplacements of the last war), of inefficiency, or enormous damage (in some other district), and so on.

An Idea for Prophylaxis

The question I wish to discuss is whether members of our profession, as individuals, can do anything in the way of prophylaxis. My belief that we can do something is based upon the following experience. In the early days of this war, when the local practitioners were very busy over emergency matters (not forgetting the perusal of a spate of documents) I took a first-aid class of A.R.P. workers (acting on the rule *unoculus inter caecos*) and to some extent concealed the excessive clumsiness of my fingers by taking pains to make the elements of physiology (the wonderful things which we have known so long that we have forgotten how wonderful they are) a little less dull than they are in first-aid manuals. It seemed to me that the class was interested. So when, in the darkness of December, my friend the local M.O.H. discussed with me the possibility of trying to mitigate the boredom of the situation I suggested that he and I might initiate lectures, to be followed by discussion, on the more general aspects of public health and medicine.

I remembered an incident of my student days. There were two out-patient surgeons, one of whom was, and the other was not, a popular teacher. It happened that Mr. A. had finished early, and a disciple of his drifted into Mr. B.'s room. "It's no good your coming here, Mr. C.," said Mr. B., "there's nothing for you to see." "But, sir," said Mr. C., "there is nowhere else to go." In my moments of greatest self-satisfaction it would not occur to me that, say, garage hands, builders' assistants, or even clerks would be interested in what I might have to say about the reports of the Registrar-General or even the declining birth rate if a picture house were available. But the times are strange.

We have carried out this plan for two months—two classes a week—and the results have been encouraging. We have certainly succeeded in interesting a fair proportion of young people. There are, of course, practical difficulties. One is that in a service like A.R.P., with many voluntary workers, offers of instruction or amusement must be open to all, and there is an inevitable tendency for the voluntary workers (who will usually be older and better educated people) to do more than their share of the discussing, so that the young people are too shy to intervene. Another is that one must take great pains in preparation. The "doctor" must neither talk down nor conceal himself in an armour of technicalities. What, I think, interests people most is the story of the development of our local and central administrative machinery, as seen from the doctor's point of view, in its relation to the prevention of disease.

Food for the Young Mind

The question, then, I put forward for discussion is whether efforts on these lines may not do something to reduce boredom and encourage young people to think seriously about subjects which they have never before considered.

I do *not* think that the need can be met by peripatetic orators. The first reaction of an administrator to a suggestion of this kind is that "the public" do not want it, and the second to appoint a central committee. In this way much more practised speakers can be secured than if reliance is put upon local efforts. Then spontaneity is lost; what is gained in skill is lost in intimacy.

All of us, even the oldest of us, know many things which are interesting, and some effort to interest bored young people is worth making. It may have a greater prophylactic value than we think.

Reports of Societies

CHEMOTHERAPY IN RELATION TO WAR WOUNDS

This subject was discussed at a recent meeting of the Medical Society of the British Expeditionary Force, the opening paper being given by Colonel L. COLEBROOK.

He said that the outstanding lesson of the great war (in the bacteriological field) was the predominant part played by haemolytic streptococci in wound infections (Fleming and Porteous, 1919; Stokes and Tytler, 1918–19; *Medical History of the War*, 1923). Although no critical analysis of deaths was made in the light of bacteriological findings it was probable that this one microbe was responsible for not less than 70 per cent. of all the deaths due to infections of wounds. The same microbe gave rise to most of the complications such as erysipelas, cellulitis, and septicaemia, which in turn were responsible for incalculable delay in recovery of the wounded and ultimate impairment of function. He recalled that out of forty-nine positive blood cultures obtained from men with septic compound fractures of the femur, no fewer than forty-four were pure cultures of haemolytic streptococci (Fleming and Porteous, 1919).

Unfortunately we did not learn during the great war when and why these infections occurred—whether in most cases the organisms were carried into the tissues at the time of wounding, or whether they were transmitted from case to case

in the hospitals, or whether they were due in large measure to dissemination of the microbe by dust or by respiratory tract carriers. The only data obtained (Stokes and Tytler) were that about 15 per cent. of a series of 365 wounds were already infected by haemolytic streptococci on admission to the casualty clearing station (average about twelve hours after being wounded), while a very much larger proportion were so infected when examined after a few days at the base. (Fleming and Porteous gave the figure as 90 per cent. for one hospital, and there was reason to believe this was not exceptional.) These figures suggested that hospital infection played a sinister part—and it might well do so again if the number of casualties to be dealt with was at all comparable. Happily we were in a much better position to-day than we were in 1914 to trace the source of these infections. To that end arrangements had already been made for a co-ordinated effort between the R.A.M.C. and the Medical Research Council. Since it would be difficult to carry out adequate differentiation of many strains in France the Council had established a central laboratory in London for that purpose.

We must also learn how to control these infections. That would be no easy task, but there was great hope in the fact that these streptococci (and, incidentally, some of the gas gangrene bacilli) had proved to be highly susceptible to the influence of red prontosil, sulphanilamide, and its first cousin sulphapyridine (M & B 693). The striking results obtained in erysipelas, puerperal fever, meningitis, and pneumonia, together with the unquestionable effects in experimental infections of animals all over the world, gave good reason to believe that these new remedies would prove of great value in controlling the acute invasive phase of established infections by haemolytic streptococci.

Preventive Treatment

Further, it might well be that by their early administration soon after the man was wounded it might be possible to prevent many of these infections from developing—or, failing complete success in that, might render them non-invasive, and therefore much less dangerous to life. The war was likely to give us a far better chance of finding out what was possible in that direction than we should have had in many years of peace. Sir Edward Mellanby had recently remarked that if such a preventive effect of these chemotherapeutic agents could be clearly demonstrated it would be almost a more important happening than the war itself.

Colonel Colebrook went on to describe the experiments which justified this hope of successful prophylaxis. Mice had been completely protected (Hoare, 1939) by a single injection of sulphapyridine suspended in oil given within a period of twenty-four hours before they were infected with haemolytic streptococci. Others had shown very good protection when sulphanilamide was given three hours before infection and at intervals after, whereas if the first dose was omitted there was no protection. It seemed quite clear that if a certain small amount of sulphanilamide was present in the circulating blood at the time the streptococci reached the tissues they were prevented from causing an acute infection. That was the essential point to keep in mind in considering how to set about prophylaxis in the wounded. Clearly, if the microbes were implanted in the tissues at the time the man was hit, as was almost certainly the case with the gas gangrene bacilli, prophylactic treatment must be started at the earliest possible moment—and particularly was this necessary in view of the fulminating course of those infections.

In planning preventive measures against infections by haemolytic streptococci, on the other hand, we were up against the difficulty that infection was probably not always caused at the time the man was wounded, but might occur in hospital during the next few days. A single prophylactic dose given by mouth shortly after the injury would be almost all excreted within ten to twenty hours, and it seemed essential, therefore, if we were to maintain the necessary concentration in the blood during the whole period of danger, that its administration must be continued for at least four days. By the end of that time the injured tissues would presumably be walled off by the proeesses of repair, and infection, if it did occur, would be a much less serious matter. (Attempts had recently been made by Fuller and James (1940) to find a method of securing slow, continuous absorption from the alimentary tract in man in order to obviate the need for frequently repeated doses, but so far these had not met with much success.)

Prophylactic Dosage

One could not say dogmatically at present what dosage was required for successful prophylaxis in man, as there was no previous experience to draw upon. Rather large doses had been suggested in the first War Office Memorandum (October 11, 1939), but it was explicitly stated that we did not know how they would be tolerated by men suffering from shock and loss of blood. Since that memorandum was issued new data had come to hand which seemed to give a definite lead as to the dosage required. These data had recently been set out by Fuller and James (1940), together with a suggested plan of dosage designed to give rapid absorption of the drug during the first few hours, and slow, continuous absorption later. The method advocated was as follows:

First Dose.—1.5 grammes (that is, three tablets of sulphanilamide) dissolved in about 100 c.cm. of hot citric acid solution (roughly 1 per cent.) or hot lemon.

Second Dose.—Two hours later, 0.5 gramme (that is, one tablet, whole or only partially crushed in order to delay absorption).

Subsequent Doses.—0.5 gramme, whole or partially crushed, at four-hourly intervals for four days.

Total: 13.5 grammes in four days.

The blood concentrations obtained on these doses in men suffering from shock would have to be checked up to make sure that they corresponded sufficiently well with those obtained on normal men by Drs. Fuller and James. It was important, too, that any toxic effects resulting from these doses should be noted. If they were well borne, but did not suffice to prevent infection, larger doses could be tried later.

In connexion with prophylaxis Colonel Colebrook urged the great importance of trying to reach a definite conclusion. It would be very easy, he said, to reach none at all if the records were incomplete as to the time of starting treatment, the total dosage given each day, the occurrence of gas gangrene, the laboratory findings. He appealed to medical officers in the forward areas and at the Base, as well as to the nursing staff and to laboratory personnel, to co-operate in this investigation. Without that co-operation it could not be carried through.

Treatment of Established Infections

The dosage required for the treatment of infections already established would not differ very much from that employed in civil practice. There was some evidence that sulphapyridine was likely to be more effective than sulphanilamide for gas gangrene,* and, in order to expedite its absorption, the first three doses (1 gramme each) should be given well crushed and so far as possible dissolved in about 100 c.cm. of hot citric acid or lemon at an interval of one to three hours. Six to eight grammes should be given in the first twenty-four hours, and the amount reduced slightly on the next day if the clinical condition was much improved. For haemolytic streptococcal infections one-gramme doses of sulphanilamide should be given four-hourly for the first day or two and the amount reduced *pari passu* with the clinical improvement. For exceptionally severe infections as much as 8 grammes should be given on the first day. The drug should be continued for four or five days after the temperature had dropped to normal and the clinical condition had become satisfactory, but it should *not* be continued after that time just because there were still haemolytic streptococci in the discharges.

Colonel Colebrook spoke next of the difficulty there was bound to be in appraising the effect of such treatment in wound infections. In the Spanish war different observers

* Personal communication. Dr. D. Stephenson and Miss H. E. Ross.

had come to very different conclusions because sulphanilamide had been given indiscriminately to all kinds of wound infections—some due to haemolytic streptococci (presumably), and some not. The same thing had happened when red prontosil was first introduced in Germany and "tried out" in puerperal fever. The obstetric surgeons who used it were not fully alive to the fact that only about 50 per cent. of puerperal fever cases were infected by haemolytic streptococci, the rest being due to a heterogeneous group of organisms—for example, anaerobic and faecal types of streptococci, *B. coli, B. proteus,* staphylococcus. Later experience of puerperal fever had shown clearly that these heterogeneous infections were influenced very little if at all by sulphanilamide or red prontosil. In every 100 patients, therefore, to whom the drug was given by the German obstetricians (without any discrimination as to the kind of infection) there were about fifty who showed no definite response; while among the remaining fifty—that is, the cases infected by haemolytic streptococci—about forty would have been patients who were never very ill and whose prompt recovery therefore left a critical observer in some doubt as to the part played by the new remedy. There remained about ten gravely ill patients who might be regarded as critical material on which to judge of therapeutic effects. The impression made by a few striking recoveries in this small group might easily have been overshadowed by the failure to show any convincing response among the other ninety cases.

If we were to avoid this pitfall in the present war it would seem to be essential that we should from the outset attempt to restrict chemotherapy to wounds known to be infected by haemolytic streptococci or by gas gangrene bacilli (and perhaps some severe infections by staphylococcus). Colonel Colebrook realized that there was a serious difficulty in doing that because we often could not afford to wait twenty-four hours for the result of a bacteriological examination. Often an examination by film alone would suffice, but if it did not he suggested that treatment should be begun as soon as there were signs of acute infection, and a swab taken from the wound at the same time. The bacteriologist should be asked to report as early as possible as to the presence or predominance of haemolytic streptococci and not to bother about other organisms (except the gas gangrene bacilli) which might take longer to identify. If haemolytic streptococci were not present treatment could be discontinued. Such a plan might of course be quite impracticable in times of heavy fighting, but Colonel Colebrook thought that, with some increase of laboratory personnel and equipment, it could be carried out at other times. Though, with experience of many wounds, the surgeons would probably be able to make a shrewd guess as to the presence of streptococcal infection, it would be of incalculable value—at any rate for the earlier period of the war—to get data as to the effect of these new drugs on *bacteriologically verified* infections. That should be our aim.

With regard to gas gangrene, it was all the more important to correlate clinical signs with bacteriological data because there were indications that some of the organisms of this group were not susceptible to these drugs. Colonel Colebrook hoped that all such organisms isolated from clinically refractory cases would be preserved, for differentiation and for determination of their susceptibility to the chemotherapeutic agents *in vitro*.

Agranulocytosis after Sulphonamides

It had been stated that this condition occurred only rarely as a result of treatment by sulphanilamide and sulphapyridine, but he could not agree with that view. More than fifty cases of complete agranulocytosis had been reported in the literature during the last two years—and as many more of partial destruction of polymorphs (neutropenia). It was certain that for every case reported there were several—probably not fewer than ten—that were not reported. He himself had heard of nearly twenty. The particulars of published cases strongly suggested that this dangerous condition (it had a mortality rate of about 50 per cent.) was closely related to the amount of drug given and the duration of treatment. The average total dose in the recorded cases had been about 50 grammes and the duration of treatment twenty days. Occasionally, however, much smaller doses and a shorter period of treatment had been recorded. The condition seemed to occur just as often in association with sulphapyridine as with sulphanilamide.

The use of these drugs on a large scale under war conditions called for special vigilance. Wounded men might be given a prophylactic course at the front and a second course when they arrived at the Base, and possibily a third in England. Such second and third courses appeared to be particularly dangerous. The risk would be greatly diminished if treatment was given only to cases known to be infected by haemolytic streptococci (or gas gangrene bacilli) and if treatment was stopped soon after the acute febrile phase had passed. It was the general experience that if an infection did not respond to these drugs within four days it seldom did so later.

Recognition of the beginning of agranulocytosis was often difficult—indeed, the diagnosis could only be made with certainty by a rapidly falling white cell count. The onset was usually insidious—a moderate rise of temperature, increasing prostration, and perhaps some headache. The typical agranulocytic angina was often not present, or developed only as a terminal event.

Colonel Colebrook thought that a white cell count and a rough estimate of the polymorphs should be made on every case receiving large doses of these drugs, on the seventh day of treatment—and, if a second or third course was given, on the first and third days of such courses; also at any time if the patient's general condition was unsatisfactory or if a sore throat developed. In conclusion he urged the need for a sense of proportion in this matter. Agranulocytosis was certainly a real danger. On the other hand, these new remedies were unquestionably of great value. Morphine was also a dangerous drug, but that did not prevent us using it, and in sufficient amount, when it was required. We had to learn the definite indications for sulphanilamide and sulphapyridine; and in many cases receiving large amounts, to regulate its administration by periodical estimations of the concentration in the blood and by white cell counts. Such safeguards, he recalled, had not proved an insuperable bar to the use of insulin.

DISCUSSION

Colonel WEDDELL hoped that the great importance of the surgical toilet of the wounds—removal of devitalized tissues and renewal of skin edges—would not be overlooked in the attempt to prevent infection by chemotherapeutic agents. He also stressed the need for active co-operation of all medical officers, particularly in the tedious business of "paper work," in the attempt to appraise the value of chemotherapy.

Colonel STOTT said he had been surprised at the suggestion that many of the streptococcal infections of the last war had originated in the hospitals and were not directly due to the wound. He hoped this would be fully investigated during the present war. He was not quite clear as to the distinction between the prophylactic and the curative treatment that was proposed. If an infection by haemolytic streptococci developed in a man who had received, or was receiving, comparatively small doses for purposes of prophylaxis, should he be put on to full doses?

Colonel COLEBROOK, replying to the first point, said that since the last war it had been clearly demonstrated (Cruickshank, 1935; White, 1936) that wounds discharging haemolytic streptococci disseminated that microbe through the air around the patient. Presumably the pus, after drying on the skin, readily flaked off in minute particles of "dust." Such particles retained viable and fully pathogenic streptococci for at least ten weeks. When one remembered the conditions in the crowded surgical wards during times of heavy fighting in the great war it was difficult to see how the wounds could have failed to become infected by such dust particles even if infection was never transmitted from case to case in the process of daily dressing. The work of Sir Almroth Wright in the last war had shown that the haemolytic streptococcus was better adapted for establishing itself in wounds than any

of the other common bacteria because the serous fluids of the wound provide an ideal culture medium for it. Unless the number of such infections could be kept very much lower by preventive chemotherapy and successful primary suture it would seem almost inevitable that the surgical wards in the present war would again become hotbeds of streptococcus infection. Replying to the second point raised by Colonel Stott, he admitted that some confusion must arise owing to the fact that the prophylactic treatment had to be continued for several days. If during that period—or subsequent to it—signs of an active invasion by haemolytic streptococci did develop, he thought the dose of drug should be at once increased to the ordinary scale given for the treatment of established infections.

Colonel MYLES asked if there was any evidence as to the efficacy of local applications of sulphonamide derivatives. He had been impressed by one instance in which the spraying of a soluble sulphanilamide preparation had been followed by a remarkably prompt disappearance of haemolytic streptococci and meningococci from the nasopharynx.

Colonel COLEBROOK, replying, thought it was unlikely that local applications would have any beneficial effect in the upper respiratory tract. Although sulphanilamide had a direct bactericidal action in the presence of body fluids, that effect was usually only manifested after exposure of the organisms to the drug for several hours. It was difficult to imagine that fluid sprayed into the nasopharynx would remain there in effective concentration for more than a few minutes. It was, moreover, improbable that such fluid would find its way into the depths of tonsillar crypts where haemolytic streptococci were believed to lodge. The local application of sulphanilamide in suppurating wounds had sometimes been proposed, but it was very doubtful if it would have any beneficial effect (Fleming, 1940). On the other hand, the remarkable success claimed by Jensen, Johnsrud, and Nelson (1939) in the treatment of compound fractures by a sulphanilamide pack prior to suture (that is, before suppuration occurs) suggested important possibilities in connexion with war wounds. This was being investigated.

Lieutenant KANAAR asked for more precise information as to "treatment in the febrile phase." He recalled a case of meningitis in which the temperature had come down under treatment, but had continued to show irregular fluctuations between normal and 100° F. for ten days or more. The patient had by that time had about 40 grammes of sulphanilamide. Was it wise to continue treatment in such a case?

Colonel COLEBROOK said that he sometimes saw cases (usually of puerperal fever) like that cited by Mr. Kanaar, and he suspected that they were often infected by an organism which was partially or completely insensitive to the action of sulphanilamide. (In five instances that insensitiveness had been confirmed by an *in vitro* test.) He thought it was not worth while to continue treatment in such cases. And it was doubtful whether anything was gained by switching over to sulphapyridine, since streptococci which were insensitive to one were usually insensitive to both drugs. This was, however, an aspect of chemotherapy which needed more investigation. He hoped that if medical officers came across cases in which prophylactic treatment of a wound had been given a good trial and had failed they would send him the organism for examination.

Major NEVIN asked what evidence there was as to the relative efficacy of sulphanilamide and sulphapyridine. Colonel COLEBROOK said that the results of experimental infections in animals indicated that the two drugs were of about equal value against haemolytic streptococci, and his own experience of human beings led to the same conclusion. With regard to infections by gas gangrene bacilli, there was too little evidence at present to permit of any conclusion. In severe staphylococcal infections, too, sulphapyridine seemed to be the more effective.

Major HARRISON asked what was the present view about cyanosis occurring during treatment by these drugs. Colonel COLEBROOK said that severe cyanosis was seldom seen nowadays when care was taken to exclude eggs from the diet and to avoid sulphate aperients. The mild degrees of cyanosis could be disregarded, and treatment need not be discontinued.

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WAR WOUNDS OF THE LARGE INTESTINE

At a meeting of the Section of Proctology of the Royal Society of Medicine on March 6 Mr. J. P. LOCKHART-MUMMERY delivered his presidential address on "War Wounds of the Large Intestine," and this was followed by a discussion.

Mr. Lockhart-Mummery said that his object was to initiate a discussion on some experiences of the last war in the hope that it might be of assistance to the younger generation of surgeons whose duty it would be to serve in the forward positions and base hospitals. The fact that peace surgery and war surgery were not the same thing was not fully appreciated in 1914, but it soon became evident that the surgical technique which had proved successful during peace required very considerable modification. Surgeons had to re-learn their job, as they might have to do again, for it was possible that the lessons of the last war would not apply to the conditions of the present.

War casualties differed from those of peace in that the patients when first seen were gravely shocked and had often lost a considerable amount of blood, and that the wounds were not only grossly septic but contained large masses of dead tissue which acted as a breeding medium for gas-gangrene and other organisms. On the other hand, the patients were nearly all young men in otherwise first-class physical condition, a very different state of affairs from that which would result if the civilian population were subjected to extensive air raids. Incidentally, if the principle of immediate operation for all war casualties was correct, the same principle should surely avail for civilian casualties in great cities, but apparently it had been arranged that the maximum rather than the minimum time must elapse between the injury and treatment in a suitable operating centre, for most of the hospital units had been moved out of London. He thought that this was a mistake, and that the whole arrangement would have to be altered if air raid casualties were to be dealt with effectively.

Value of Immediate Operation

The late Hamilton Drummond in 1919 reported to a meeting of what was then the Subsection of Proctology on sixteen cases of gunshot wounds of rectum and colon which had come under his observation behind the fighting lines in France. Fourteen of these patients had died, the principal factor resulting in death being injury to the retroperitoneal tissues. Drummond's opinion was that the only hope lay in immediate operation and free drainage of the damaged tissues, accompanied by the establishment of a temporary colostomy. One wondered, in face of a mortality of nearly 90 per cent., whether such treatment was worth while. Was it possible to find some other form of treatment for these cases which would give them a better chance of survival? During the first six months of the last war, when the expectant treatment of all abdominal injuries was the routine method, the mortality from such injuries was about 70 per cent., or, if the deaths in the base hospitals were added, 80 per cent.* After this practice was given up in favour of advanced operating centres and the routine procedure was to operate on all cases

* Figures from *War Surgery of the Abdomen*, by Sir Cuthbert Wallace.

at the first available opportunity the mortality in these abdominal cases dropped to between 50 and 60 per cent.

Mr. Lockhart-Mummery's opinion was that, at any rate in the early years of the last war, there was a tendency in dealing with bowel injuries to attempt too much at the primary operation. The ruling principle should be to do as little as possible at the primary operation, and to do that little as quickly as might be. A temporary colostomy should be established at once, and this should be done in the transverse colon and the two limbs sewn together so that subsequent closure could be readily effected by means of an enterotome.

Shocking Injuries

Many of the injuries in the last war were dreadful. Faecal fistulae combined with gross sepsis and comminuted fractures of the pelvis or spine were common. Many of the wounds contained foreign bodies. He remembered removing a molar tooth from a man's loin, yet the patient himself showed a perfect set of teeth. Pieces of wooden fencing, buckles, shell-caps, leather, and clothing had to be taken out in order to get wounds to heal, but it was soon learned that many foreign bodies of this nature were best left alone. He saw an officer who had a bullet embedded in the body of his second cervical vertebra. On looking into his throat the point of the bullet could be seen protruding from the back of his pharynx. He had no spinal symptoms, and it was decided, he thought wisely, to leave the bullet where it was.

Secondary haemorrhage was a great difficulty. In one patient, a Guards officer wounded at Mons, the bullet had driven part of his sword-hilt through the loin into the abdomen. He had a faecal fistula of the sigmoid and a wound passing backwards to the spine, where a piece of metal had smashed the body of the third lumbar vertebra. Three days after arriving at hospital he got a serious secondary haemorrhage from a lumbar artery, and the bleeding could only be arrested by packing the wound through the faecal fistula. He eventually recovered. Of one strange injury of the rectum he saw two examples—the complete blowing away of the anal opening and lower rectum. The usual site of the anal opening consisted of a large wound with no sign of the rectum or anus. On examination it was found that the rectum and anal opening had retracted into the pelvis for more than an inch, but they were quite undamaged, and he was able to draw the anus down again and secure it in the proper position.

He also saw a number of cases in which bullets had passed completely through the rectum from side to side and caused no damage. The scars could be both seen and felt, but the wounds had healed spontaneously. A number of cases were seen in which the man had been shot right through the false pelvis, the bullet having passed through the colon and several coils of small gut without causing any serious damage.

It was quite a common thing to find a patient with several faecal fistulae opening on to the abdominal wall or in the loin. The principle which guided the treatment of these cases, and proved most effectual, was to free the intestine thoroughly and cut away all scar tissue before attempting to do end-to-end anastomosis, so that the junction was made with healthy intestine. The greatest difficulty was to restore the gap in the abdominal wall, which was often very large and surrounded with dense scar tissue. He found that the best plan was to cut away all the scar tissue and slide in large flaps of skin and deep tissues to fill up the gap.

Temporary Colostomy

He emphasized the importance of doing an immediate temporary colostomy, when considered necessary. This should be of the double-barrel type in the transverse colon, so that easy closure could be secured with an enterotome. Most of the colostomies which came under his care in the last war and had to be closed were not of this type, often having very poor spurs, and it was necessary to dissect the bowel completely out and do an end-to-end anastomosis, a point which should be borne in mind when performing temporary colostomy. It might well happen that the right side of the colon was damaged, in which case a colostomy would, of course, be of no use. He did not think the Paul type of colostomy took any longer to do than the ordinary one with a glass rod, and there was no doubt that it was vastly safer to close.

Finally Mr. Lockhart-Mummery put forward the following principles as important:

1. Restoration of parts should be done at once, or left until all wounds had healed. Operation in the intermediate stage was more than likely to go wrong, and such operations should be confined to drainage of septic areas and removal of foreign bodies.

2. All wounds should be healed and all sepsis eliminated before attempting reconstruction of the large bowel or anal opening.

3. All dense scar tissue should be widely excised and only healthy tissue brought into apposition. This was particularly true when attempting to repair damaged colon accompanied by faecal fistula.

4. Tension of any kind must be avoided "like the devil"!

Multiple Wounds

Sir CHARLES GORDON-WATSON said that it was difficult to throw one's mind back twenty-five years, but there were certain features of the wounds seen at that time which one could not forget. Wounds of the colon were not often met without wounds of the small gut and other viscera. Mr. Lockhart-Mummery had suggested that sometimes too much was done, but it was really essential that every wound should be dealt with once the abdomen was opened. Multiple abdominal wounds in which the colon, especially the fixed colon, was concerned had an extremely high mortality. Faecal extravasation, haemorrhage, and retroperitoneal infection were the great bugbears. Colon wounds were often large and ragged and extremely difficult to close. They were frequently complicated by wounds of the spinal column and cord. An injury to the cord was recognized by the paralysis of the limbs, and such cases were seldom if ever operated on. Wounds of the splenic angle were very difficult to reach. More often than not they were complicated by injury to the spleen and diaphragm. Combined chest and abdominal wounds were some of the most desperate, yet a percentage of such cases made good recoveries.

Suturing of the colon always required a double layer of stitches. In a few instances resections were done, but recoveries were rare. A long paramedian incision was generally employed, but some used the transverse incision. A long incision was necessary because in nearly every case there were multiple injuries.

Wounds of the rectum might be intra- or extra-peritoneal, or both, and more often than not they were complicated by wounds of the wall of the pelvis or the bladder or buttock. In buttock wounds the rectum was also very often injured, a fact sometimes missed by the inexperienced. The mortality from rectal wounds was extremely high, due to the extravasation and haemorrhage, followed by anaerobic and streptococcal infection. In wounds of the lower part of the rectum he was sure it was wise to divide the sphincter and put in a large tube. When the wounds were very severe and complicated a transverse colostomy was generally advisable. In some of the worst cases of abdominal wounds which were recorded as too far gone for operation the patients did occasionally recover, but they had to be given enough morphine to inhibit all intestinal movement and to reduce the respiration to the very threshold of death.

Four reasons made him think that better results would be obtained in the surgery of this war than in that of the last: (1) the great advance in anaesthesia; (2) the blood transfusion service, which should ensure that it was available for all wounded who needed it, assuming that stored blood gave as good results as fresh; (3) reduction of infection by the early use of sulphanilamide; (4) acceleration of operation by the use of suction for clearing the field of blood.

A Plea for Courageous Surgery

Surgeon Rear-Admiral GORDON-TAYLOR said that he had gathered an impression from younger surgeons that they thought abdominal surgery in warfare not worth doing. He hoped to correct that impression. He had always a profound respect for the surgery of the large intestine. There were certain reasons why the large intestine proved to be a very vulnerable structure, and the surgery directed towards it to be often doomed to failure. In many cases in which the large intestine was wounded there was an immense amount of extravasation and blood, and for these reasons mere suturing might prove a very precarious reed to lean upon. A badly damaged, perhaps devitalized bowel held sutures badly.

The cases of injury of the large intestine which in his experience did repay surgery were the smaller extraperitoneal lesions where a man had been hit by a small fragment of shell. A double layer of sutures should be used in cases of large intestine injury, in distinction from injuries of the small intestine, where a single layer sufficed admirably. In many cases of gunshot wounds of the large intestine, however, lives were lost because the surgeon had not the courage to do more than suture a badly damaged piece of bowel instead of excising pieces of the bowel in certain selected cases. Gangrenous ulceration of the mucous membrane of the rectum usually followed indirect injuries to the bowel. The missile, passing across the back of the rectum, very often tore some longitudinal fibres and interfered with the vascular supply. In this type of case extensive retroperitoneal infection of the post-rectal tissues often followed, with an almost inevitable fatal result. So desperate were some of these cases that he had often excised portions of the caecum. In many gunshot wounds of the large intestine other viscera were injured—the bladder or urethra—and often there was an osseous lesion of the pelvis complicating the rectal wound and adding enormously to the mortality. Not only might the pelvic girdle be involved, but very likely the blood vessels of the pelvis. Not every case of a gunshot wound of rectum and bladder and other structures proved fatal. One point to bear in mind was the desirability of putting one's finger into the bladder to ascertain whether a missile was lodged there. In many cases in which a foreign body was retained in the pelvis it proved to be in the bladder itself. The performance of a colostomy in cases in which one was uncertain about the suture line of a piece of rectum was extremely useful. It was useful also in those cases in which the anus had been almost completely blown away from its perineal attachment, and in some of the cases of gunshot wounds of the rectum low down, provided that adequate drainage was afforded in the perineum.

The point on which he desired to insist was that in some of these cases in which the bowel was extensively damaged the surgeon should take his courage in both hands and deal radically with some of these pieces of large intestine where, he was perfectly certain, minor measures would fail.

Desirability of Free Exposure

Professor G. GREY TURNER pleaded for a very free exposure. He was prepared unblushingly to advocate that, in dealing with gunshot wounds of the abdomen, they should not hesitate to make a large free opening in the middle line. It must be no niggardly opening. The patient would not die because he had a big lesion of the abdominal wall; he might die if an insufficient opening were made which embarrassed further procedure. Having opened the abdomen, the surgeon must make a complete diagnosis. He must know the whole of what he had to deal with before he dealt with any particular part.

So far as the large intestine was concerned, the damage with gunshot wounds was likely to be much more than the usual puncture from ulceration; that applied especially to the part of the large intestine uncovered by peritoneum. With regard to the rectum, Mr. Lockhart-Mummery and others had stressed the extreme importance of drainage. To drain the retroperitoneal tissue of the pelvis it was necessary to have an opening from behind, and he suggested the removal of the coccyx if considered necessary. One other point about after-care in cases of multiple fistulae was that there would be less escape from the fistulae if care were taken to make the evacuations as normal as possible—that is, solid or semi-solid.

Mr. G. T. MULLALLY said that there was no doubt that gunshot wounds of the abdomen which damaged the colon had a higher mortality than wounds which damaged only the small intestine. One reason for this was that wounds of the large intestine were very much more difficult to find. The wound might be in the neighbourhood of the mesentery or a large appendix might be lying over it, and it was quite easy for it to be missed, and in the "unperitonealized" part of the colon the difficulties were still greater. Damaged tissue was seen, but no obvious hole. The most valuable help in finding the hole in the uncovered portions of the bowel was the sense of smell. The smell of faeces could always be detected if there had been a wound of the large intestine, and that was where it differed from a wound of the small intestine, which did not leak because there was paralysis. It was inevitable to miss some wounds, and this kept up the mortality from wounds of the large intestine as compared with wounds of the small. The other reason why mortality was high in wounds of the colon was that if the wound was in the uncovered portion of the large bowel infection was likely to gain hold in the retroperitoneal tissue. He had never known a patient recover from a spreading retroperitoneal cellulitis.

In dealing with wounds of the large intestine he thought that Surgeon Rear-Admiral Gordon-Taylor was wrong in urging frequent resection. Large resections of the colon were a simple matter to the experienced surgeon, but they carried with them a considerable amount of anxiety. He himself was one of those who learned his surgery in the last war, and he tried resections of the bowel as well as sutures of the bowel, and he was in no doubt that his patients had greater fortune where he was content to take the less heroic measure. It was true that it was not satisfactory in the large intestine just to sew up the holes, partly because infection had already occurred outside them, and partly because it was more difficult to estimate how grossly a piece of the large intestine had been damaged than in the case of the small intestine. One was often disappointed to find that, while the sutures had held, the bowel for an inch or two below the sutures had sloughed. In his view the thing to be aimed at was drainage of the wounded area wherever it might be. By all means, when the surgeon got to know what he could do, let him endeavour to save the patient by resection, but he did not think they should start with the idea that resection of the large intestine was a good method of treatment in the first place.

General Discussion

Mr. W. TURNER WARWICK agreed with Mr. Mullally. To resect the colon and do an end-to-end anastomosis meant a high mortality. He deprecated Mr. Lockhart-Mummery's use of the term "temporary colostomy," which the average student might misunderstand. What the President had in mind would be better referred to as decompressive or exclusion colostomies.

Mr. W. B. GABRIEL asked what clinical or other evidence was available as to rectal injury in a buttock wound. In some cases, no doubt, there would be a discharge of blood or mucus from the rectum; but supposing the wound was small, was it possible to pass a finger or safe to pass a sigmoidoscope, or would the blowing of air into the rectum be extremely harmful? With regard to the anal sphincter, in civilian practice they were concerned to repair or save the sphincter. Was there ever need to cut the external sphincter? If good posterior drainage had been established, especially after the removal of the coccyx as had been advocated, he hoped that it would be rarely necessary to cut such an extremely important muscle, having in view the patient's eventual recovery.

Surgeon Rear-Admiral GORDON-TAYLOR said that he had no hesitation in the appropriate case in dividing the sphincter or in converting the rectum into a cloaca. The diagnosis of rectal injury in buttock wounds was made by haemorrhage

from the bowel, or, if there was still doubt, one could put one's finger in. He thought the introduction of the sigmoidoscope would be attended by a certain amount of danger.

Mr. ASLETT BALDWIN gave a description of certain cases with which he had dealt in the last war in which a temporary colostomy had proved useful. Mr. MICHAEL SMYTH agreed as to the importance of draining the rectum itself, but he thought that wounds of the rectum should be considered as of more than one type and the treatment might be modified accordingly. Mr. NAUNTON MORGAN raised certain questions as to the arrangements for operating on civilian casualties in hospitals in the cities or at a distance, and Lieutenant-Colonel J. C. BARRETT mentioned that among the equipment for base hospitals the latest form of suction apparatus was to be provided.

Mr. LOCKHART-MUMMERY, in summing up what he described as an admirable debate, said he thought they could come to the conclusion that surgeons who had to deal with the cases behind the lines must be courageous; they must not be discouraged by a 50 or 70 per cent. mortality. Even if thirty patients out of a hundred were saved, something well worth while was being done. With regard to the transverse incision, he would have thought from his experience of operations in civil life that the transverse incision was probably one of the best that could be used in multiple injuries of the intestine. He could not think why surgeons were so afraid of it. It enabled one to get at everything inside the abdomen with the utmost ease. He had never had any trouble in making this incision; the whole thing healed most admirably, and he thought it might well be the best incision for many of these cases with multiple wounds.

INDICATIONS FOR REMOVAL OF TONSILS AND ADENOIDS

A meeting of the Section of Laryngology of the Royal Society of Medicine on March 1, with Mr. T. B. LAYTON in the chair, was devoted to a discussion of the indications for the removal of tonsils and of adenoids in children.

Sir LANCELOT BARRINGTON-WARD said that medicine and surgery suffered from changing fashions, and tonsillectomy had not escaped this influence. Possibly a decade or so ago tonsils were removed for inadequate reasons. The peak year was 1930, when at Great Ormond Street 7,430 such operations were performed; the figure for 1938 was 2,729. More than one cause had contributed to the decline in numbers. An "anti-tonsil" faction had developed an almost religious fervour, of the kind which had arisen from time to time against circumcision, and the debate was hotly engaged in lay as well as medical circles. The pendulum of fashion had perhaps now swung too far in the opposite direction, but he thought a greater measure of agreement was now possible.

In his experience the tonsil was the more dangerous element in the partnership. Its structure allowed organisms to lie dormant. Adenoids, on the other hand, only acted mechanically by obstructing natural respiration or by a low-grade infection. The importance of adenoids was greatest in the early years of life; in later years, if adenoids were present, tonsils were usually infected as well, and it was wise to deal with both. If adenoids only were removed and septic tonsils left behind, adenoids were very likely to grow again. The mere size of the tonsil was not an indication for its removal unless by reason of its size it was injuring the patient. A septic tonsil, whether large or small, was a menace to its owner, and should always be removed. It was not always easy in children to diagnose tonsillitis by symptoms alone. Children often did not complain of the throat at all, even during an acute attack, and unless a routine examination of the throat was made in every sick child it could easily be missed. Chronic enlargement of the glands of the neck was indicative of tonsillar infection. The tonsils had been made responsible indirectly for a multitude of conditions, including rheumatism, heart disease, and chorea. There was some evidence that rheumatism was less likely to attack individuals who had undergone tonsillectomy, but the influence of the tonsils in precipitating a relapse was even more striking and more easily proved. Another indirect indication was chronic septic poisoning affecting various systems. It was not uncommon in the out-patient department to see a flabby child with scoliosis, knock-knee, talipes valgus, or similar conditions suffering from a chronic infection of the tonsils, and the first thing to be done was the elimination of the toxaemia.

The least definite of all indications was recurrent or persistent nasopharyngeal catarrh and the common cold. If the patient was subject to colds, and if every cold started with a sore throat, there was reason to hope that the removal of the tonsils would prevent further attacks. If the colds returned they were less severe and of shorter duration; but the wise surgeon would give no guarantee of complete immunity. In the more frequent form, when the child every winter developed a snuffy catarrh of the nose and throat, it was possible that the sinuses were affected, or there might be some general metabolic fault, and tonsillectomy was useless.

The School Medical Service Point of View

Dr. J. D. KERSHAW said that the school medical officer had certain advantages in observation, being able to see the failures of other people and compelled to see his own. His attention was drawn to this problem when he was Assistant M.O.H. at Ealing in 1933. He began by assuming that the presence of a condition which was constantly relieved by operation could be regarded as an adequate indication for the performance of that operation, and on investigating the after-histories of several hundred cases of tonsillectomy he obtained an indication that such conditions as recurrent sore throat and the prolonged sequences of otitis media were improved by operation in the large majority. On investigating the question of the size of the tonsil, however, he came across something which was rather new to him. Out of 1,000 children who had been reported as having enlarged tonsils at the school medical examination he found that less than 10 per cent. had developed symptoms subsequent to the first discovery of the tonsillar enlargement; also that with increasing age there was an unmistakable tendency for the tonsil to diminish. With regard to rheumatism the results were inconclusive. Children seemed as liable to develop rheumatic symptoms after tonsillectomy as before. In 1935 he went to Accrington, where he found the tonsillectomy rate among the school children to be one of the highest in the country. Approximately 200 tonsillectomies were carried out annually, and the number of children annually entering the schools was about 400. Here again he tried to find indications for operation, such as size of tonsil, appearance of sepsis, and symptoms which he had previously found to be relieved by operation, but these symptoms appeared to be fairly constantly present, especially in younger children whom he had been told were not proper subjects for tonsillectomy. Accrington had a nursery school to which children were admitted from the age of 3, so that it was possible to investigate the school population at an early age. The child's admission to the school was apt to be followed after about six months by enlargement of the tonsils, frequent colds, possibly chronic catarrh, recurrent sore throat, and other factors commonly associated with septic tonsils. These conditions lasted for from one to two years, varying with the home circumstances and state of nutrition, and in 75 or 80 per cent. of cases cleared up quite spontaneously and quickly. It appeared, therefore, that this condition depended, not upon any particular age factor, but upon the child's first exposure to the common nasopharyngeal infections of childhood, that the response of the tonsils was presumably protective, and that the process which completed itself in from eighteen months to two years was to a certain extent an immunizing one. If the enlargement of the tonsil, therefore, was secondary and protective, it behoved one to look rather more cautiously into the indications commonly given for removal.

A Plea for Conservatism

Dr. T. S. RODGERS believed that there was only one indication for tonsillectomy—namely, repeated attacks of tonsillitis from which the patient did not recover completely in the

intervals and which was unrelieved by other forms of treatment. Size alone might be an indication, but tonsils could be very large without causing disability. In the diagnosis the history was much more important than the physical signs; repeated attacks of tonsillitis not due to epidemics were the most important factor, and tonsillitis in children was, more often than not, a painless disease, not attended by much discomfort. When adenoids were found there was one single indication for removal—namely, nasal obstruction which would not yield to conservative measures. He believed adenoids to be a result and never a cause of infection. The characteristic symptoms of adenoids were local. As for age, he claimed that no child should have his tonsils removed before school age, and the older the better. The Board of Education had recommended that no operation be done in the epidemic period of the year, which was the first four months. In every case certain preliminary investigations and treatment should be carried out. Home conditions should be investigated. The child might be living in an overcrowded house, exposed to repeated infections. Teeth should be treated, attention given to the nose and sinuses, and nasal hygiene established. There were certain common conditions for which tonsillectomy was done, he believed, without good results and sometimes with harmful ones. These were colds in the head, nose diseases like chronic hypertrophic rhinitis, diseases of the nasal sinuses, asthma, bronchitis and pneumonia, rheumatism, and nephritis. Tonsillectomized children with these conditions frequently suffered more than children who had not had their tonsils removed. The mere passage of time would relieve many of these conditions. In an L.C.C. children's hospital it was a common experience for children to come in with large septic tonsils, which went down in size in a month or two. As illustrating the diversity of practice with regard to this question he mentioned two English towns, both beginning with "B," in one of which a school child was twenty-seven times more likely to have his tonsils removed than in the other. In one London district it was found that the tonsillectomies suddenly rose from 2 per cent. of the child population to 28 per cent., coinciding, of course, with the appointment of a new medical officer.

Miss D. J. COLLIER said that the chief problem of the laryngologist was to establish the relation between the state of the tonsil and adenoids and the symptoms of the disease from which the patient suffered. She pleaded for the abolition of the term "enlargement of the tonsils and adenoids." The amount of total tissue was of no importance without reference to the size of the nasopharynx. If adenoids blocked the airway or the Eustachian orifice they should be removed. The Basque children, aged from 5 to 15, were found to have tonsils as large as or larger than walnuts, but on their dispersal to various parts of this country their state of health compared favourably with that of the English children among whom they were placed. In rheumatic children she believed that the tonsils should be removed only when tonsillar infections were a feature of the disease. The conclusion she reached was the need for a more widespread recognition of the fact that removal of tonsils and adenoids was not a panacea for all the ills of childhood. Each patient should be judged on the relation between the tonsillar condition and the symptoms.

General Discussion

Mr. C. HAMBLEN-THOMAS said that laryngologists were frequently not supplied with enough material by the physician who had had the child under observation. He deprecated tonsils and adenoids operations on children if they were a lazy and short-cut method of treatment for a general condition. Some of the cases which on investigation had no signs of infection still had persistent catarrh in the winter. He thought local and general treatment should be tried before operation on the tonsil. Two indications for removal of tonsils and adenoids were persistent ear trouble in children and tuberculous adenitis. The frequency of lung abscess after tonsillectomy had been mentioned. In his own cases, dismissing all personal bias, he could not say that chest complications had been more frequent than 1 in 1,000.

Mr. MUSGRAVE WOODMAN attached a good deal of importance to the fixity of the tonsil. A fixed tonsil was much more dangerous than one freely movable. He protested against the rule mentioned by one speaker that a child should never be operated on until school age. He would rather say that the tonsils should be operated on when this was necessary, but preferably not until school age. He was dubious of comparisons with the Basque children. How could one compare children who had been living on the slopes of the Pyrenees with children living in West Ham and going to a Council school among infected schoolfellows?

Mr. C. A. S. RIDOUT said that among thousands of tonsillectomies in the records of his hospital he could not recall a case in which lung abscess had been a sequel. He endorsed the opener's remark that each case needed to be decided on its merits. If a rigid rule were followed grave blunders would be made. Mr. E. A. PETERS mentioned that he had had the opportunity of examining a large number of Indian troops, among whom he had found no trace of tonsillar infection, yet in the same part of India children of the white population suffered. Dr. GEOFFREY MARSHALL said that every month he had children brought to him with chronic bronchitis or asthma, and, without any preconceived notions on the subject, he had been impressed by the history, for again and again he was told that these children suffered from catarrh or some local condition in the throat, and on that account their tonsils had been enucleated. Shortly after the operation they had developed, for the first time, pulmonary complications. He was convinced that this was often a case of cause and effect. The removal of the tonsil had been the factor which had rendered the child a chronic bronchitic. He thought it would have been better if the removal of the tonsils in these cases had been less complete. Tonsillectomy was a rare cause of lung abscess in this country, though apparently not in America. Some years ago he met an American doctor in London whom he had met previously during the last war, and on asking him his purpose in England he replied that he had come to have his tonsils out. To the remark that it was a long way to come for a tonsil operation he replied, "Well, I did not want lung abscess." Professor M. HAJEK thought that the tonsil was unduly blamed for infections due to other causes. Mr. D. B. SUTTON referred to the large number of tonsillectomies carried out on public schoolboys. On three occasions children had been brought to him during the school holidays with the statement that the head master had requested that they should undergo a tonsil operation before their return. Dr. W. H. BRADLEY said that the Medical Research Council inquiry into tonsillar infection in public schools, to which the previous speaker had referred, concerned only cases in which tonsillectomy had been carried out before the child went to the school. Mr. R. SCOTT STEVENSON deprecated the presentation of statistics that took no account of the nutrition and housing of the child, which were possibly the most important factors in the problem. Before public health administrators criticized the attitude of laryngologists towards tonsils and adenoids operations they should survey all the factors.

Sir LANCELOT BARRINGTON-WARD said that the two conclusions he had gathered from the discussion were that the school medical officer must in the future be a highly trained clinician and that repeated tonsillitis was the most definite indication for operation. Dr. KERSHAW replied on the point concerning the age at which tonsillectomy should be done. He agreed that cases of emergency might arise at any age, but he suggested that ordinarily cases should never be subjected to operation until the period of immunological enlargement had arrived—the first two or three years of school life. With regard to septic foci he could not avoid the cynical reflection that sometimes the removal of tonsils was due less to the fact that they were a septic factor in that particular case than to the fact that they were the most accessible of all possible factors.

Local News

IRELAND

Dr. Denis J. Coffey

The March issue of the *Journal of the Irish Free State Medical Union* announces with regret that the time has come by the statutes of the University for Dr. D. J. Coffey to relinquish the presidency of University College, Dublin, which he has held since its establishment in 1908. Dr. Denis Coffey graduated in medicine in 1888 at the old Royal University of Ireland, of which he was later elected a Fellow; he has received the honorary degree of LL.D. of Trinity College, Dublin, and the honorary Fellowship of the Royal College of Physicians of Ireland, and he has represented the National University of Ireland on the General Medical Council since 1920. He served on the Royal Commission on Trinity College and the University of Dublin in 1906, and was one of the Dublin Commissioners under the Irish Universities Act, 1908. Our contemporary publishes also a glowing appreciation of Dr. Coffey and his work, over the initials "J. C. F." Two brief passages may be quoted. "To the young University Dr. Coffey gave his whole energies unselfishly and without reserve, and there is no one in it who does not realize that he gave to it more time, more thought, and more self-denying service than his office required. It was inevitable that he should assume the whole burden of its early administration both because in efficient planning there can only be one direction and because of the whole-hearted and generous interest of the man. As the University grew he did not spare himself, and long after he might have safely delegated power he did not do so, because he was impelled by the compulsion of a whole-hearted conception of duty. . . . A medical man himself, he had a special interest in his own profession, and the successful growth and assured standing of its Medical Faculty are due in part to his wisdom and to the character he gave to its formation. It would have been so easy for it to become an inferior provincial medical school, with little of the professional tradition of medicine and hardly more than technically sufficient. As it is, it stands in the front rank of medical schools and owes its structure and tone to its head."

Medical Registration Council

At the recent half-yearly meeting in Dublin of the Medical Registration Council the reports of Sir W. I. de Courcy Wheeler, who had inspected the final examinations in surgery held in University College, Dublin, University College, Cork, and in the Apothecaries' Hall, were discussed. These reports completed the inspection of final examinations made at the request of the Council—in midwifery and gynaecology by Professor R. J. Johnstone, and in medicine by Sir Humphry Rolleston. The material collected in connexion with the preparation of the seventh *Pharmacopoeia* was considered at this meeting, and the registrar reported on various matters, including the figures of registration of primary and additional qualifications. The following members of the Council were present: The President, Dr. Denis J. Coffey, Professor J. W. Bigger, Mr. W. Doolin, P.R.C.S.I., Dr. J. C. Flood, Professors J. N. Meenan, H. F. Moore, T. G. Moorhead, J. M. O'Donovan, R. J. Rowlette, and S. Shea, and Mr. R. A. Stoney.

Medical Research

The Medical Research Council of Ireland has made the following awards: Dr. S. J. Boland—grant for carrying out an investigation of pelvic architecture at the National Maternity Hospital, Dublin, under the direction of the Master, Dr. J. F. Cunningham. Dr. T. E. T. Bradshaw—whole-time research grant for one year for a study of sex hormones; work to be carried out at the Rotunda Hospital, Dublin, under the direction of the Master, Dr. A. H. Davidson, and Professor W. J. E. Jessop. Miss E. M. Mason, D.Sc.—whole-time grant for one year for work on goitre research in Co. Tipperary. Miss Mason will work under the direction of Dr. Martin Naughten, county medical officer of health, Tipperary, South Riding, and Professor Joseph Reilly, University College, Cork. This grant has been made possible by the co-operation of the Iodine Educational Bureau, London. The bureau, in addition to a cash contribution, is supplying the necessary iodine preparations required for the investigation. Dr. Cecil Mushatt—grant-in-aid to assist him in meeting the expenses of further training in America. The Council has also sanctioned the renewal of the undermentioned grants: Professor T. W. T. Dillon—grant-in-aid renewed for six months from February 1, 1940. Dr. R. A. Q. O'Meara—whole-time grant renewed for one year from April 1, 1940. Professor Hans Sachs—whole-time grant renewed for one year from May 1, 1940. Miss E. J. Power Steele—part-time grant renewed for one year from December 1, 1939.

ENGLAND AND WALES

Registered Medical Auxiliaries

Several corporations have recently arranged facilities for treatment by medicated baths and have made provision in local Bills for such treatment. In conjunction with the Chartered Society of Massage and Medical Gymnastics, the Board of Registration of Medical Auxiliaries has in three instances been successful in persuading the authorities concerned (the most recent instance being that of the Christchurch Corporation) to amend their Bills so as to secure that such treatment is carried out only by persons whose qualifications are recognized by the Board or by persons recommended by medical practitioners. This draws attention once more to the important work the Board of Registration of Medical Auxiliaries is doing for the medical profession. Its primary objects are to co-ordinate the various branches of medical auxiliary work; to encourage the employment of duly qualified assistants; and to prevent the exploitation by untrained persons of medical auxiliary work. As there is, unfortunately, plenty of scope for the last mentioned, practitioners are advised not to employ for physiotherapeutic and other forms of medical auxiliary work persons whose qualifications are not officially recognized by the medical profession. In matters of doubt the Board is willing to give advice. In addition to the Register of Physiotherapists (that is, Chartered Masseurs and Masseuses, Radiographers, and Bio-Physical Assistants) and of Dispensing Opticians, the Board has also published the first Register of Orthoptists—persons trained to treat cases of squint under the direction of a medical practitioner. It will shortly publish the second Register of Chiropodists, containing the names of members of four of the largest and oldest organizations of chiropodists and the majority of those who practise under conditions approved by the British Medical Association. The total number of persons registered with the Board of Medical Auxiliaries in the various categories is approximately 10,000, and it urges that doctors should have by them for reference the names, addresses, and qualifications of the medical auxiliaries in their areas. With this end in view it invites medical practitioners to apply to the Board for a list of names and addresses of the particular group of medical auxiliaries in which they are interested. Lists can be obtained on application to the Registrar, Board of Registration of Medical Auxiliaries, B.M.A. House, Tavistock Square, London, W.C.1.

Maternity Hospital for Officers' Wives

The Maternity Hospital for the Wives of Officers in the Royal Navy, Army, and Royal Air Force, situated at Fulmer Chase, Fulmer, Slough, Bucks, is now open for the admission of patients. It is under the auspices of a council, representing all three Services, of which Field-Marshal Sir Philip Chetwode is chairman and Sir Comyns Berkeley honorary treasurer. Fulmer Chase lies in beautiful grounds between Gerrards Cross and Slough, and transport facilities are provided from

each of these stations. There are in residence a senior medical officer, matron, and trained staff; the obstetric consultants are Dame Louise McIlroy and Mr. Eardley Holland. Consultants are also available for any extra-obstetric complication, and arrangements are made for major surgical treatment. The hospital was instituted for the care of the wives of officers of limited means, and strict priority is given to those needing help most. The inclusive weekly charge is four guineas, and there is a small fund to help those who are unable to meet this charge. There are also a few single rooms at eight guineas a week. Patients remain under their own doctor's care until the time of admission. Applications, which should be sent to the honorary secretary, Maternity Hospital for the Wives of Officers in the Royal Navy, Army, and Royal Air Force, 60, Portland Place, London, W.1, are coming in well, but there are still vacancies.

Infectious Diseases in Newcastle

The annual report for 1938 of the medical officer of health, city and county of Newcastle-upon-Tyne, records the largest number of marriages since 1920, evidence of improved economic conditions and increased prosperity. The marriage rate for the period under review slightly exceeded that of England and Wales as a whole. Another satisfactory figure is that for the infant mortality rate—66 per thousand children born, a considerably lower figure than any previously recorded in the city. The local maternal mortality rate, although still somewhat high, has decreased to a marked extent since the introduction of sulphanilamide preparations in the treatment of streptococcal infections. With regard to the general death rate the report records an increase in the number of deaths from cancer. This increase occurred chiefly in cancer of the digestive system in females, and in cancer of the respiratory tract in both sexes. Deaths from pulmonary tuberculosis registered a decline for the first time for three years, the total number being, with one exception, the smallest yet recorded. This is attributed to the great schemes of slum clearance and rehousing which have been carried out recently in the city. Among infectious diseases the incidence of bacillary dysentery, which had been prevalent since 1928, showed a distinct decline: 81 cases were notified as compared with 205 in 1937. In 36 of these the diagnosis was confirmed bacteriologically. All cases were infected with the Sonne type of bacillus. With the exception of one outbreak, involving ten cases, at the Newcastle General Hospital during the month of January, the cases were sporadic. There were three deaths.

London Ambulance Service

On the outbreak of war the London Ambulance Service's system of dealing with telephone calls for ambulances was decentralized, and a wartime organization was set up under which calls were dealt with by the control centres of each metropolitan borough. By arrangement with the London Civil Defence Regional Headquarters, it has now been decided that all ambulance calls, except those for street accident and emergency cases, shall be dealt with by the London ambulance headquarters as in peace-time. The following procedure should now be followed: (1) Calls for ambulances for fever or small-pox cases should be made to the London Ambulance Service (Waterloo 3311). (2) Calls for ambulances for street accidents or other emergencies should be made by dialling 999. The caller will then be connected with the ambulance officer at the appropriate borough control centre, who will arrange for the dispatch of an ambulance. (3) If an ambulance is required for an admission to one of the Council's general hospitals, the medical superintendent of the hospital should be informed and the necessary arrangements will be made by him. In cases of extreme urgency application for the ambulance may be made direct to the London Ambulance Service before communicating with the medical superintendent. A medical certificate that the patient is fit to be moved should be provided in every case. (4) All other ambulance inquiries, including applications for the hire of ambulances, should be made to Waterloo 3311.

Correspondence

The Tourniquet

SIR,—Mr. Dickson Wright has drawn attention to the Samway tourniquets that have been issued for controlling haemorrhage in first-aid work. In the country district in which I have been in charge of first-aid work since the crisis of September, 1938, these tourniquets formed a belated issue in September, 1939. As soon as I saw them I wrote to the appropriate County Officer saying that in my opinion they were unworkable, the rubber being so thick and inextensible that it would not enter the anchor and thus make fast, and pointing out the seriousness of the situation if my batch was representative of the whole supply. The reply (September 30) told me that similar complaints had been received and that the Ministry was being notified. An officer dealing with first-aid party equipment came from the Home Office to talk the matter over with me after about three months, and I went fully into it with him, pointing out how much more suitable elastic bandages would be and how unworkable his Samway tourniquets were. If a strong man stretches one of these tourniquets hard and wrenches it forcibly it will go home, possibly after a failure or two; a nurse usually cannot do it. The forcing on may be a painful process to a normal limb; the forcing off, which must be done after a short interval, requires almost equal force. What this putting on and off would mean to a patient with a smashed limb simply does not bear contemplation. If I may assume that the tourniquets that have been supplied to my services are representative—and those I have seen in several other services, and the remarks of Mr. Dickson Wright, support this view—there must be many tens, possibly hundreds, of thousands of these instruments of torture about the country. If they are successfully applied to stop haemorrhage they will cause infinite suffering, and their rope-like hardness, and the impossibility of any easy adjustment of tension, will destroy many nerves or limbs; if the attempt to apply them fails, as it very often will, life will be lost.

I believe I am correct in saying that the Home Office was at first responsible for these tourniquets. It is difficult to ascertain who is now responsible, but it lies between Home Office and Ministry of Health. Whichever it is, it is certain that six months and three months have passed since first one and then the same or another appropriate authority was informed. What is being done, this year, next year, I do not know; I do know that not a single one of these dangerous tourniquets in my district has been replaced. I ask the space of your columns now to point out publicly this grave defect, to remark that it takes nearer six minutes than six months for a man to bleed to death, and to urge others of your readers to speak their minds on the deplorable neglect of the public welfare that this instance of the tourniquets displays.—I am, etc.,

University College Hospital, March 8. THOMAS LEWIS.

SIR,—It is curious to read Mr. Dickson Wright's letter on the tourniquet in the *Journal* of March 2 (p. 364) after reading the letter from Mr. R. Shackman in the previous week's issue. The latter gives a good instance of the danger of the tourniquet, but Mr. Wright appears to be of the opinion that the present first-aid teaching is definitely wrong. In the last war the results of the frequent resort to the tourniquet were so disastrous that instructions were issued in a circular by the authorities forbidding its use, if I remember rightly, unless medical aid was easily accessible. It was considered that the risks from haemorrhage were less than those arising from the application of a tourniquet under the conditions obtaining on the battlefield, where it could not be known how much time might elapse before the wounded man reached a dressing station or field ambulance. From Mr. Shackman's case it is clear that even under the conditions obtaining at home three

hours may elapse before the patient is seen by a doctor, and that by this time gangrene will have commenced. It is therefore idle to say airily, as Mr. Wright does, that "the answer to all this is that the tourniquet should not be removed till the patient is in safe surroundings in hospital, where the haemorrhage can be controlled by surgical methods." The whole question is, How long can the tourniquet be safely left alone? If the patient can be got into hospital within half an hour the difficulty scarcely arises. If it takes longer than this the first-aider must have some definite instructions how to act, and it is difficult to see what else he could do but relax the tourniquet and tighten it again if the bleeding recurs.

In first-aid classes at the beginning of the last war my experience was that V.A.D. workers were far too ready to apply a tourniquet for any sort of haemorrhage, and it was necessary to impress upon them that the proper treatment for *most* cases of haemorrhage is pressure on the bleeding spot by means of a bandage over a dressing of good thickness; and this point, I am glad to see, is made in Mr. Shackman's letter.

Mr. Wright goes on to say that "it is also time now that the modern teaching on keeping the bloodless limb cool should have reached the first-aid handbooks." Surely he overlooks that many things that can be done in a hospital are quite impracticable under the conditions in which first aid is commonly administered. I shall be very interested to hear what advice Mr. Wright has to give us on "keeping the bloodless limb cool" as a first-aid measure under the ordinary conditions of first aid.—I am, etc.,

E. WEATHERHEAD, M.B.,
Temporary Captain R.A.M.C.; over-seas, 1915–19.

Southborough, Tunbridge Wells,
March 3.

Cold Feet and Gangrene

SIR,—In his letter in the *Journal* of March 2 (p. 364) Mr. A. Dickson Wright raises an important point and one which does not appear to have received the recognition it deserves. I refer to the temperature at which it is desirable to maintain a limb which is threatened by gangrene.

Mr. Dickson Wright states that a limb in which the circulation has been arrested by means of a tourniquet is best kept cool and not warm, thereby reducing the rate of metabolic processes and of multiplication of bacteria. Surely the same argument should apply to limbs in which the circulation is impaired as a result of organic changes in the blood vessels, in consequence of which gangrene is threatened. Nevertheless, how often does one hear of cases of senile or diabetic gangrene having their toes kept "nice and warm" by means of electric-light cradles, etc.? Presumably the reasoning is that gangrene is due to ischaemia of the tissues; tissues which are warm are well supplied with blood; therefore warm up the tissues and cure the gangrene. This, if a little metaphor-mixing may be pardoned, is putting the cart before a very tired horse and flogging the poor beast. It is somewhat reminiscent of the idea of achieving physical fitness among our under-nourished masses by giving them physical jerks to do.

Tissues are not well supplied with blood because they are warm, but are warm because they are well supplied with blood. There is no reason to suppose that by artificially warming toes which are gangrenous as a result of organic arterial change the blood supply thereto will be increased. On the contrary, the vessels concerned are usually firmly thrombosed by the time gangrene has developed and are totally incapable of carrying blood. In any case the accumulation of metabolites which result from incomplete oxygenation, and which therefore must abound in tissues on the verge of gangrene, constitute in themselves almost a maximal stimulus to vasodilatation. On the other hand, although the local application of heat cannot increase the blood supply to the part, it can and, as Mr. Dickson Wright points out, does increase the rate of metabolism and therefore the demand for blood in the tissues affected.

It would appear more reasonable to treat these cases by keeping the feet cool—in the case of moist gangrene a current of cool air from an electric fan has a dual cooling and drying effect—and the body warm, so as to induce generalized vasodilatation. In this way the requirements of the imperilled tissues are reduced to a minimum and their supply augmented within the limits imposed by the extent to which thrombosis has occurred in the vessels concerned.—I am, etc.,

Woodford Green, March 4. J. S. HORN, F.R.C.S.

"Radium Practice"—An Omission

SIR,—A sentence in the informative article on "Radium Policy and Practice" in your issue of March 2 (p. 358) is so constructed as to permit an inadvertent omission of great importance. "All cancer patients," it states, "should be seen in consultation by a radiotherapist, a surgeon or specialist surgeon, and, if possible, a pathologist. . . ." No team is, in fact, complete without a physicist. It may not be necessary for the physicist to see every patient, but it is essential at the present stage of irradiation technique that the physicist should see every type of case, and that his special knowledge should be available to check the field and dosage of every irradiation.

A time will come when so much is known about volumetric fields for every type of apparatus and every arrangement of units that the physicist, who has provided the information, will be needed less frequently; but it is not yet. To-day to the physicist!—I am, etc.,

London, W.1, March 5. E. ROCK CARLING.

Peptic Ulcer in the Services

SIR,—I understand that problems of considerable importance have arisen, as was inevitable, in connexion with young men in the Services found to be suffering from peptic ulcer, particularly duodenal ulcer.

Those of us with much experience of this disease have believed for a long time that the best course to adopt is to discharge such men as quickly as possible, because otherwise a high proportion of them will become a burden to the State, it being wellnigh impossible to keep them fit in the dietetic circumstances inevitable during service, whether in this country or over-seas.

During the last twenty years I have had under my care many officers of the Navy, Army, and Air Force suffering from various effects of peptic ulceration. With few exceptions it has been possible, occasionally with the help of surgical intervention, to keep them at work. None of them has died, and I think not one of them has been invalided out of the Services; but it would be untrue to suggest that their work has not at times, and sometimes seriously, been interrupted. In general they have presented a far greater problem than have officers suffering, for example, from diabetes mellitus. But the preservation of a trained and valuable officer is a very different question from the retention of a recruit who will not only tend to have recurring illnesses but will later have a justifiable claim to a pension for a disease which has been aggravated by service.

There is, however, a further aspect of the problem which calls for emphatic comment. I have been told that it is claimed that many of these recruits could be rendered fit for service if they were treated by the surgical removal of the duodenum or part of the stomach. To anyone with wide experience of such cases the suggestion seems so absurd as to be incredible, but I have been informed of it by such high authority that I wish, through your columns, to inquire whether any surgeon is seriously making such a claim.—I am, etc.,

London, W.1, March 7. T. IZOD BENNETT.

Diagnosis of Gas Gangrene

SIR,—In December, 1916, I wrote an article on gas gangrene for the *Archives of Radiology and Electrotherapy*. At Royaumont, France, where the Scottish Women's Hospital was stationed, every wounded soldier passed, as soon as possible after arrival, through the *x*-ray department. Plates

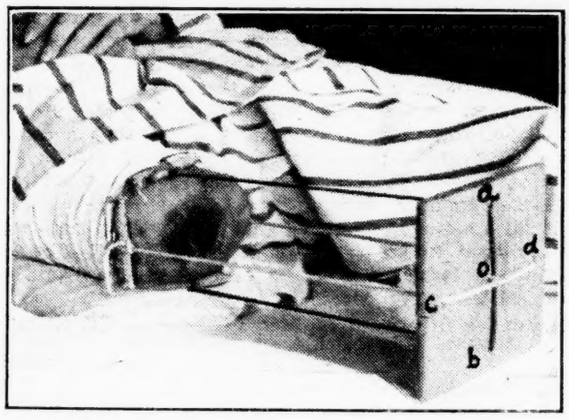
were developed quickly, and I sent a report: "Urgent; gas near wound" or "some distance away." In the article are illustrations of the several types of gas gangrene; the type which infiltrates along the muscle fibres was usually rapidly fatal. The wounded who had gas were taken at once to the operating room. This method of rapid diagnosis and early treatment was the means of saving many lives.—I am, etc.,

London, W.1, March 8. AGNES SAVILL.

Amputation Stumps and Artificial Limbs

SIR,—It was with great interest that I read Mr. P. Jenner Verrall's article on amputation stumps and artificial limbs in your issue of January 13 (p. 62), particularly that part of it which dealt with the after-treatment of circular amputations. May I with due respect to the author amplify somewhat the method I was in the habit of practising while I was R.M.O. at the King George Hospital, London, during the great war of 1914–18, and which in a large number of cases obviated the necessity for re-amputation. We all know of the many instances in which the saving of an inch of bone would be of paramount importance for obtaining a serviceable stump.

Extension, apart from encouraging healing, helps to bring the soft parts down to cover a bone that would project if no extension is applied. But it must be carried out when the virulent stage of sepsis and sloughing is subsiding and not before. A piece of adhesive plaster eight inches long by three wide is spread on the long axis of the stump to each of its anterior, posterior, and two lateral surfaces, to within one and a half inches from the edge of the wound, but keeping about two inches of the lower end of the adhesive plaster free. The free end of each of these strips of plaster is in turn folded over a pencil-shaped piece of strong wood (or strong wire) three inches long and then held fast by safety-pins (see Fig.).



Several turns of adhesive plaster are then applied firmly round the stump, but just enough to grip the skin and muscles without hampering the circulation. A piece of cord one yard long is then tied by one end to the middle of the anterior piece of wood (or strong wire) by passing it through the plaster. The free end is then passed through hole *a* in the stirrup (see Fig.) and then through hole *b*, and it is carried back to be tied to the posterior piece of wood. Another piece of cord is similarly tied to the lateral wooden pieces. A third piece of cord is next run through the central hole, *o*, of the stirrup to be attached over a pulley to a weight of two pounds or less, according to the particular stump. The length of the cord, and consequently the distance between the wound and the stirrup, makes dressing quite an easy affair.

I am indebted to Dr. Albert Norman, late honorary clinical photographer to the King George Hospital, for the excellent photographs I am sending with this letter. A glance at them would be more instructive than any words of mine.—I am, etc.,

Tauta, Egypt, Feb. 19. ABD-EL KHALEK SELIM.

*** We have space for reproduction of one photograph only.—ED., *B.M.J.*

First Aid for Mustard-gas Burns of Eye

SIR,—The following is the first-aid treatment that I have recommended for the unit where I am stationed, which may be of interest to your readers. It aims at simplicity and safety, and is intended for first-aid stations. It could be given by those who are untrained in, or at any rate unfamiliar with, eye work.

ALL CASES

1. Irrigate with luke-warm fluids, with eyelids gently closed (using undines if time permits). Otherwise patients can bathe their own eyes over a bowl with an eye-bathing brush (shaving or pastry brush will do).

2. Lotions in order of preference.
   (*a*) Sodium bicarbonate 2 per cent.
   (*b*) Boric lotion 2 per cent. (or 1/2 teaspoonful to a pint of water).
   (*c*) Normal saline.
   (*d*) Water (sterile if possible).

3. Use lubricating eye drops.
   (*a*) Liquid paraffin (paroleine), *not* paraffin oil.
   (*b*) Cod-liver oil (with or without glucose), two drops three or four times a day.

4. All patients should keep eyelids gently closed and allow tears to flow freely. *No pads or bandages to be used.*

SEVERE CASES

1

All ages.—Use oily homatropine 2 per cent. in olive oil (one drop three times a day).

Under 40 years of age.—Oily atropine 1 per cent. in olive oil or ung. atropinae 1 per cent.

2

Do not use cocaine drops to relieve pain unless compelled to do so, as pain causes a profuse and beneficial flow of tears, which are the natural eye lotion to bathe the eye. Decicaine and procaine are less harmful than cocaine.

3

Do not separate the lids except to reassure patients who are unduly alarmed about loss of sight.

Prevention is better than cure, and your gas mask gives protection.—I am, etc.,

J. MYLES BICKERTON, F.R.C.S.,
Denham, Bucks, March 6. Squadron Leader, R.A.F.V.R.

New Ointment Bases

SIR,—While I appreciate your encouraging comment regarding the provision of improved ointment bases (*Journal*, March 2, p. 354), I feel that the ideal is yet far from achievement. H.E.B. bases represent an advance on similar commercial products. I have elsewhere stressed their therapeutic and physical values. May I, through your columns, be the first to issue a note of warning regarding certain minor deficiencies and enlist constructive criticism?

The fundamental criteria repeated in your article will be accepted without criticism by every thoughtful dermatologist, but the shortcomings of available products are many. May I stimulate interest by mentioning several disadvantages of Haldens Emulsifying Bases. First, it would appear essential to find ointments of greater physical stability than H.E.B.s. As these are to-day they reach a semi-liquid form on the human skin far too rapidly and lose practical efficiency thereby. Secondly, H.E.B.s may dry the skin even when used to make a stable emulsion of such incompatibilities as olive oil and lime water. *In vitro* they cannot exercise such effect. *In facto* they do. (The explanation of this probably lies in the "spreading" of perspiration over a wider area of skin with consequent atmosphere loss.) Thirdly, idiosyncrasy to several of their constituents would appear to exist. Fourthly, many chemicals are rendered by their solvent capacity far too active when incorporated in accepted therapeutic concentration. (For example, I have found that mustard gas is irritant to an excessive

degree in the presence of an emulsifying base.) It is likely that standards of external dosage will have to be considerably modified if emulsifying bases can safely come into general use. Paraffin wax and lanolin bases may have, throughout the history of skin therapy, exercised a restraining effect on their chemical content! Fifthly, it is a matter of regret that the preparation of emulsifying bases is expensive because of the costly machinery required. Experimental work can thus only be undertaken on a large scale with the co-operation of the large commercial firms, with their consequent financial "interest."

In conclusion, it is clear that a wide field exists for experiment. It is only by unprejudiced and comparative trial that a balanced decision can be expected. Too much is easily claimed for innovations in medicine. It would be a matter of regret if disrepute were thrown on the utilization of emulsifying bases by premature enthusiasm. I hope in future to introduce improved bases free from several of the above deficiencies, but meanwhile ask for criticism, suggestion, and investigation from your readers.

My comments apply with equal force to the investigation of the value of H.E.B. protectives. Their role in treatment and prevention of occupational dermatoses demands a practical evaluation of a theoretical efficiency.—I am, etc.,

P. B. MUMFORD,
Manchester, March 5. M.D., F.R.C.P.

Why Drink Milk?

SIR,—After more than fifty years of rather bitter experience I was pleased to see Mr. F. R. Brown's letter (February 10, p. 232) asking a question I have often put and for a like reason. Some of the following facts may give his critics pause. (Milk here means cow's milk, raw.)

(1) Milk is food for sucklings; with the sophisticated exception of the domestic cat man is the only animal that drinks milk after weaning. Japs, Chinese, Eskimos—all virile races—do not drink milk and do not need it. Nor did our forefolk. I was asked to examine a skeleton recently found in a stone cist and estimated as that of a man of about 50 or 60 who died some 3,000 years ago. The skull held beautiful teeth with perfect occlusion and ground by constant chewing of hard food, a normal palate, a nasal septum in the mid-line and straight as that of a horse. This man had not drunk milk after weaning, eaten milk puddings, chocolates, or ice-creams, had not needed a dentist or the T. and A. operation. His skull would delight Harry Campbell.

(2) Clean raw milk often breeds disease—for example, asthma, rhinorrhoea, eczema. It is not possible to cure these, at least in many cases, while the patient takes much milk—even boiled milk. For such patients one experienced dermatologist used to say, "Boiled milk at bedtime is poison." My cat, fond of milk, often vomited it, and was tortured with eczema till the milk was stopped. Both asthma and rhinorrhoea have increased since the milk stunt began; often I have had to stop milk at home and in school, with prompt relief to both troubles. Milk, fluid in a tumbler, becomes a solid in the stomach. Difficult of digestion, it is more so when there is achlorhydria, as often happens with such children.

(3) Milk is often filthy, perhaps the filthiest food we get. One has only to see some byres and dairies to realize this. That was the obvious reason for a farmer's wife who brought her child to my clinic saying, "Naebody aboot a ferm drinks milk." (But see below.) Hutchison and Mottram in their *Food and Dietetics* (p. 146), after quoting a German statement that in Berlin the daily consumption of milk included 3 cwt. of manure, go on to say: "One looks forward to the day when the drinking of raw milk will be considered as barbarous as the eating of raw meat is at present."

(4) Notwithstanding the reduction of tuberculous udders to less than 1 per cent., the conveyance of tuberculosis by milk is still far too common. One surgeon informs me that he has to operate for tuberculous glands much more often in cases from farms in his area than from the general population. In another area tuberculous meningitis has increased since the milk slogan began. The percentage of tuberculosis in the carcasses of cows is enormous—and no wonder in view of the unnatural strain put on the animals and their winter "Lebensraum."

(5) Milk in this country contains little vitamin.

Mr. Brown's critics would do well to read Harry Campbell's "What is Wrong with British Diet?"; also to note the reference to soya bean on page 315 of the *Journal* of February 24. Fermented milk is another story too long to discuss here, but it is worth noting that buttermilk, which is readily digestible, is produced from churning milk previously heated to 140° F.—I am, etc.,

Glasgow, March 3. JAMES ADAM.

Blood Group Tests

SIR,—In the *Journal* of February 24 (p. 297) Dr. G. L. Taylor and his co-workers discuss weak A reactions in AB bloods, and draw attention to the possibility of obtaining incorrect results when testing bloods of that type. This is an important and well-timed contribution in view of the large numbers of blood group tests that are being carried out in connexion with the emergency blood transfusion services. For this purpose it is necessary that the bloods supplied should be accurately grouped and conform strictly to the slogan, "That which is named on the label is found in the bottle," since should the emergency arise cross-grouping tests will be impossible in most instances.

It is perhaps the safeguard afforded by the cross-grouping test that is to blame for the slackness of the technique sometimes found in the grouping of donors in peace-time, with inadequate controls (or none at all) and with sera that may or may not be potent. For medico-legal purposes, however, it has always been the practice at St. Mary's to make the fullest control tests, and not only to test the corpuscles with sera of known potency but to test the serum of the blood under examination with cell suspensions of the appropriate groups. In this event it is believed that the mistaking of an A_2B blood for a B is virtually impossible in the hands of an experienced worker, and Dr. Taylor appears to agree. Very occasionally it does happen that a particular blood cannot be grouped with absolute certainty, due to delayed development of the blood group or to the presence of rare additional agglutinins or agglutinogens. In such a case the pathologist would be strongly advised to refrain from offering an opinion if there was the slightest doubt in his mind concerning its group.

It is, however, appreciated that where large numbers of bloods have to be tested for statistical or other research purposes a technique must be evolved commensurate with practical laboratory conditions.—I am, etc.,

Inoculation Department, St. Mary's Hospital, W.2, March 4. D. HARLEY.

Rubella

SIR,—At the beginning of the last war, when a man in camp got rubella he and his tent mates and the tent were removed to a site outside the camp. No one of the mates developed rubella. Later on we did not bother about isolation: the case of rubella was just excused duty for a few days. The present-day fuss about this very minor illness is absurd.

By contrast it would be a blessing to the community if a rash accompanied "influenza." Also in France, at a C.C.S. a mild case of mumps was only isolated in theory.—I am, etc.,

Birmingham, March 4. W. J. BURNS SELKIRK.

Psychopathic War Disabilities

SIR,—The War Pensions Appeal Board at Auckland, N.Z., has included psychoneurotic factors in its statistical investigations, and, in view of the conflicting opinions that have been expressed in your columns recently, they may be of interest. I am indebted to the chairman, the Hon. Sir Walter Stringer, for permission to quote from the official records.

Of 460 ex-soldiers who appeared before the Board in the years 1937 and 1938, 109 were in receipt of a pension for psychopathic disabilities that had been variously described as

"functional nervous disorder," neurasthenia, anxiety neurosis, effort syndrome, and neuro-circulatory imbalance, such conditions being frequently in association with wounds and other disabilities resulting from active service. Of the men who saw service in France 38 per cent. were so afflicted, as compared with 25 per cent. for the Anzac and Palestine group; this discrepancy is doubtless a reflection of the vastly greater amount of high explosive to which the men were subjected in France.

In accordance with the age-service aspect of the statistical method that has been adopted, the following information is available in respect of (1) age groups, (2) Service groups:

Age Groups

	Under 45	45 to 50	50 to 55	Over 55
	Per cent.	Per cent.	Per cent.	Per cent.
Actual distribution of ex-soldiers, 1936 Census	55	19	16	10
Distribution of all 460 ex-soldiers	40	27	22	11
Distribution of 109 cases of psychoneurosis	45	24	19	12

Service Groups

	Under 6 Months	6 to 12 Months	12 to 18 Months	Over 18 Months
	Per cent.	Per cent.	Per cent.	Per cent.
Distribution of all 460 ex-soldiers	40	20	18	22
Distribution of 109 cases of psychoneurosis	31	20	25	24

The periods of service include only the actual time with a unit in contact with the enemy; periods of absence as the result of wounds or illness or for training purposes are not included. It is apparent that "age" and duration of "fire-step service" are not material factors in determining the incidence of psychoneuroses; in the Board's opinion such disabilities relate to underlying constitutional factors that are peculiar to the man himself, although, without doubt, their onset frequently relates to special incidents on active service.

One cannot help being struck by the severity and persistence of psychoneurotic symptoms and their exacerbation in civil life by factors that would in many cases seem to be inadequate. Functional nervous disorders were a pensionable disability in 25 per cent. of the men examined; it should be borne in mind that in no sense are they a cross-section of the N.Z.E.F. and that such a pensioning authority would tend to concentrate such cases. Without doubt the pensions bill has been greatly increased by this type of disorder, and it is to be hoped that the interest that is being taken in this aspect of battle casualties will result in a different method of approach as regards rehabilitation and pensions in the present war. The system in vogue in New Zealand is modelled on that of Great Britain, and it has been far from satisfactory in that it has failed to produce results, both as regards the health of the men and the size of the pensions bill.

The secret of successful treatment is that it should start in the early stages and should be coupled with gainful employment. While departmental bureaucrats can scarcely be held responsible for the "horse and buggy" methods following the last war, there will be serious criticism if similar methods prevail once more; without doubt they have resulted in exaggeration and perpetuation of such disabilities. While there has been political objection in N.Z. to "under-rate workers' permits," there is no reason why the colony system should not be adopted on the lines of the Papworth Village Settlement. The initial cost would be amply justified by the eventual health and monetary results. During medical examination on enlistment psychopathic tendencies frequently reveal themselves in the form of neuro-circulatory imbalance, which should be evident to the average examiner. If such cases are kept out of the firing line pensioning authorities will experience less difficulty in determining the attributability of psychoneuroses to war service.—I am, etc.,

War Pensions Appeal Board, Auckland, N.Z., Jan. 31. W. N. ABBOTT.

Treatment of Varicose Ulcers

SIR,—This subject, recently debated in your columns, particularly interests me. Approaching the problem from the supposition that the ulcer, once established, impregnates the whole surrounding parts, particularly the skin and subjacent tissues, by reason of the continued absorption of infective agents, I decided that to the first case I got I would apply my principle of "lymphatic control," the principle and practice of which I have fully described in *The Foment Danger*.

The case was that of a man of 65, with a long-standing ulcer about 4 by 3 inches on the front of the leg, the condition of the skin the common one of very dark hue. In order to prevent the spread via the lymphatics I bound the leg from the knee to the ankle, employing quite a moderate amount of pressure, with adhesive elastic plaster; a marginal opening was left around the edges of the ulcer. I tucked in "cellophane" to keep the discharge from the bandage. I then applied an ointment consisting of powdered tablets of sulphanilamide and vaselin, 10 grains to the ounce on lint, and renewed it every few days. At the end of three weeks the ulcer was rapidly healing, and I only renewed the bandage because the swelling had subsided and the bandage was slack. The whole leg presented a remarkable appearance: from being extremely dark there were numerous patches of almost normal skin. Later I heard that the ulcer had healed completely. From the first application of the treatment all the former pain quickly disappeared. In this particular instance I do not attribute virtue to the adhesive plaster beyond the fact that it kept in place. I think an ordinary bandage such as one made with an elastic tendency would have answered equally well if firmly applied. I would condemn the pure rubber for many reasons.

I should add that this ointment I had found very effective in children with impetigo; it was purely an unorthodox experiment. And, lastly, in justification of my treatment by lymphatic control, the following quotation from a letter (November 27, 1939) by a very well known professor of surgery at a large university in the British Isles. He writes: "I have followed your work with great interest, and I believe the principles which you have urged will, if fully accepted, go far in improving the technique and the results of wound infection treatment."—I am, etc.,

London, Feb. 22. J. L. AYMARD.

Treatment of Burns by Occlusive Plaster

SIR,—Some time ago I had occasion to apply an occlusive plaster for infected burns of the feet, already treated with tannic acid, for reasons identical with those mentioned by Surgeon Lieutenant C. R. G. Howard (*Journal*, February 24, p. 319). The result was so gratifying that it has since been my custom to treat such injuries exclusively with plaster cases, on the Winnett-Orr principle. Their recovery has been satisfactory, for healing takes place rapidly with the formation of a surprisingly thin and supple scar, the foot is supported and controlled throughout, and the patient is comfortable.

In areas devoted to heavy industry the splashing of molten metal into the top of a workman's boot is not infrequent, and the resulting burns, while varying in degree, give the foot, and especially its sole, the appearance of having been baked. It is in my opinion undesirable, if not impossible, to remove the thick and densely coagulated skin in preparation for tannic acid applications; while the subsequent necessity for splintage and dressings during the inevitably prolonged period of healing adds greatly to the patient's distress. Hence toilet of the foot rather than of the burns is carried out, and, though vesicles are opened and the covering epithelium removed, no attempt is made to interfere with hardened, roasted skin. Special care is taken to render the toes, nails, and interdigital clefts as clean as possible, for those areas are usually grossly contaminated with dirt and organisms, and they, together with all intact areas of skin, are painted with merthiolate tincture or an equivalent antiseptic. The toes are separated by sterile gauze pads, the burnt areas are covered with strips of gauze impregnated with petroleum

jelly or iodoform paste, and the whole is enclosed in plaster. The patient seldom complains of pain, and at the end of three or four weeks the plaster is removed. Healing is frequently well advanced, but further immobilization in plaster may be necessary, and active movements of the limb are encouraged throughout. Offensive odours are minimized by nursing the patient in the open air and by surrounding the plaster case with muslin bags loosely packed with pieces of charcoal.—I am, etc.,

West Bromwich, March 2. W. E. WIMBERGER.

A Philosophy of Medicine

SIR,—The leading article in the *Journal* of March 2 (p. 351) on the mechanics of diabetes is of interest, not only because it places the relationship of the pancreas, diabetes, and insulin in its true perspective by removing the sole responsibility for diabetes from the pancreas, but also because it serves to expose the doubtful basis of present medical "science."

A posteriori evidence, which is the customary requirement in any scientific investigation, can never possess a really comprehensive significance in medicine without some basic *a priori* conception. This has been shown again and again in medicine. The reason for this, in my opinion, lies in the undoubted fact that medicine is not science but art. That is to say, medicine is the *individual* interpretation of nature and life. There is little altruism in many medical teachings, because, unlike pure science, which can reasonably expect to discover truth from the unknown, medicine is endeavouring to extract truth from the unknowable, which is man. The fault may be partly attributed to the teaching of medicine, which aims at supplying numbers of facts, tests, signs, symptoms, and treatments rather than disseminating a comprehensive medical philosophy in the Osler or Alexis Carrel manner. To presuppose, moreover, that medical truth can *only* be attained by following the orthodox medical road is obscurantism at its worst, and must lead to more and more disappointments like that of insulin. The statement that "the health of the living cell is comprehensively dependent on its surrounding medium" is still a good basic foundation on which to build academic research or routine therapeutics.

Let us hope that the new medicine that is being evolved *in vivo* on a dietetic, psychological, and even spiritual basis will not be opposed by the old scientific cry for proof and more proof *in vitro*.—I am, etc.,

Kearsley, March 4. DAVID OCKMAN, M.B., M.R.C.S.

Herniotomy in Old Age

SIR,—I see you are publishing accounts of herniotomies in old age. I think I can beat all those printed so far. About forty years ago I had a very remarkable old lady as a patient who in her youth had been a playmate of Queen Victoria's at Kensington Palace. She was corpulent with a pendulous abdomen, and troubled with large right and left inguinal herniae. I was sent for early one morning, and found the right one was strangulated. The late Charles Stonham of the Westminster Hospital operated successfully. It was a curious scene. The patient in a small iron bedstead in a very narrow room with hardly space to move in, so much so that I had to lie down beside her with her head over my left arm and my thumb in her mouth to make an airway whilst I dropped chloroform with the other hand on to the mask. All went well. The sac was not removed, but was sewn up and to the neighbouring structures with kangaroo-tendon suture. The old lady recovered perfectly, and was about in a fortnight. I sat her up in bed that night for two or three hours. Now comes the sequel. Exactly a year later the other hernia strangulated. Again Stonham and I went through the same drill successfully. Again the old lady recovered, though the recovery was delayed by a stitch abscess for a fortnight. She was 89 the first time, 90 the second, and lived for nearly five years more. Apart from the ability to live in the patient, I think the result was due to the great rapidity and certainty with which Stonham operated. He was perfectly ambidextrous, and could "cut round a corner" quicker than any other surgeon I knew—and I have known and worked with a large number of the London and Newcastle surgeons of my generation. My oldest patient was a man of 92 from whom the late Sir Charters Symonds removed a rodent ulcer in the cheek. The anaesthetic was gas-and-oxygen mixed in a large Clover's bag. All went well, and the patient survived for over a year without recurrence.—I am, etc.,

Appledore, Kent, March 4. F. WILLIAM COCK.

SIR,—The publication of Messrs. J. A. Ross and A. Fraser's case of successful operation for strangulated inguinal hernia (*Journal*, February 17, p. 256) in a man aged 93 has prompted a number of others to record similar cases in elderly people, and has shown (1) that such operations may safely be performed; (2) the value of local analgesia; and (3) that if resection is necessary this may also be safely undertaken, Mr. D. Lang Stevenson (March 2, p. 367) having reported a successful resection of strangulated small intestine in a woman of 80 years of age. My experience accords with these observations.

A man aged 83 who was operated upon on Christmas Day, 1937, for a strangulated right inguinal hernia was found upon telephone inquiry of his doctor to-day to have been out walking in the street this morning and looking very well; and only ten days ago I had to resect some six inches of non-viable small intestine, the strangulated contents of a femoral hernial sac of a retired miner aged 78, who has made a good recovery. Twelve days previously this patient had been operated upon for the relief of a strangulated femoral hernia, the knuckle of bowel after invagination of the constriction ring having been returned to the abdomen in the hope that it was viable. A recurrence of obstructive symptoms, however, necessitated further operation and the resection of the damaged loop. The reported cases emphasize a trenchant remark of Professor Grey Turner's that old patients have just as much right to be relieved as young ones, and, as Sir John Bland-Sutton used to quote, "The abyss is worth a leap, however wide, When life, sweet life, is on the other side." One may add—even though the patient's age would suggest that the span on the other side may not be a very long one!—I am, etc.,

Cardiff, March 8. LAMBERT ROGERS.

Osteomalacia

SIR,—In connexion with your leading article on the above subject in the *Journal* of March 2, it is appropriate to mention that in an article by Emslie and myself in the *Biochemical Journal*, 1934, **28**, 1503, entitled "Rickets in Chickens, with Special Reference to its Nature and Pathogenesis," one of the conclusions arrived at was that osteomalacia was a pure acalcicosis. Where calcium, as a remedy for this condition, is administered in considerable doses as the gluconate, carbonate, lactate, etc., vitamin D is essential for its proper metabolism. In an article in the *British Medical Journal* (September 30, 1933) I have submitted evidence, however, to show that where calcium, as a constituent of the dietary of the ordinary individual, is provided in correct form and amount—as, for example, in a *luxus* supply of milk—vitamin D is not necessary for its assimilation.—I am, etc.,

Aberdeen, March 4. J. P. MCGOWAN.

Anaesthesia for Operation on Face Wounds

SIR,—In Mr. Edward D. D. Davis's article on treatment and primary suture of face wounds in the *Journal* of March 9 (p. 381) he says: "A tranquil anaesthetic is essential, and more particularly if a fracture of the skull is suspected. Evipan, avertin, or some pre-anaesthetic medication is helpful." With regard to evipan—and these remarks apply to pentothal and "venesetic" as well—induction of anaesthesia is often accompanied by much coughing and consequent straining, which is quite unavoidable. I have many times encountered coughing after these barbiturates have been given intravenously; and when N_2O+O_2 only have been given I have been particularly careful to blow the gases through the machine before starting and to squeeze out the bag so that no trace of ether vapour could be present; yet in about 50 per cent. of cases coughing occurs the moment the mask is

applied. The addition of CO_2 to the gases does not seem to reduce the coughing either, and with blood in the nose and pharynx a ghastly mess is soon produced. Once intubation has been accomplished and the pharynx packed with liquid paraffin gauze a tranquil anaesthesia is assured whether basal narcosis has been given or not, but I would strongly advise against the administration of the popular intravenous barbiturates in these cases.—I am, etc.,

London, W.1, March 9. J. U. HUMAN.

Anaphylaxis after Injection of Tetanus Toxoid

SIR,—In reply to Dr. A. G. Auld (*Journal*, March 2, p. 368) we cannot ascribe the illness observed after injection of tetanus toxoid (*Journal*, February 24, pp. 292 and 294) to the toxicity or high histamine content of the Witte peptone, as certain subjects have received a first dose of 1 c.cm. of a batch of toxoid with impunity, but developed serious symptoms only after a second injection of 1 c.cm. of the *same* batch. The Witte peptone is *not* added to the toxoid, as Dr. Auld suggests, but is an important constituent of the culture medium. The filtrate of the broth culture constitutes tetanus toxin, which is then converted into toxoid by the addition of formaldehyde and incubation at 37° C.

Both the "ordinary" Witte peptone which we used and peptone "special 30," to which Dr. Auld refers and which was introduced for therapeutic purposes, have a common origin—namely, beef and pork fibrin. Dr. F. Witte kindly gave us permission some time ago to make this statement.

Investigations are now in progress on alternative forms of culture medium for the production of tetanus toxoid.—We are, etc.,

Wellcome Physiological Research Laboratories, Beckenham, March 11. H. J. PARISH. C. L. OAKLEY.

"War and the Medical Services"

SIR,—In the *Journal* of February 24 (p. 313) your critic of the pamphlet "War and the Medical Services" insists that "the confidence of a man in his doctor is an essential element in the efficient prevention and treatment of disease." So he argues that any scheme for a medical service that does not allow free choice of doctor is unlikely to provide the best possible service for the individual citizen.

Apart from the fact that free choice of doctor is now so limited by geographical and financial considerations as to be largely illusory, I disagree profoundly with your critic. Certainly the patient who needs psycho-analysis needs a particular relationship with a physician in which confidence of a kind is essential. And undoubtedly treatment by suggestion is ineffective unless the same emotional attitude essential for successful hypnosis is present in the patient. But only those patients who need analysis or hypnosis need a particular doctor to trust. Other people could equally well have confidence in State-selected doctors, who with State-provided holidays and pensions and postgraduate tuition might be more likely to be trustworthy than the harassed G.P.s of the present system. So the argument that the average patient must choose a doctor and trust him in order to enjoy the best possible medical service is, to my mind, equivalent to the assertion that the average patient is psychopathic. And the uncritical acceptance of this argument by the majority of doctors suggests to me that they themselves may be distraught by excessive trust and the other disadvantages inseparable from the practice of medicine for private profit.

One potent argument for the "freely chosen" doctor is, in my opinion, that which stresses the need for continuity of treatment. A doctor who has known a patient for a period of years and who knows his family and his circumstances is more quickly able to be helpful than a stranger. But I must qualify this admission by the assertion that proper case-note taking could materially reduce this advantage of the family doctor as opposed to the State doctor. And probably in a State medical service it would be arranged that each patient would have a doctor assigned to supervise his search for health in the way in which a tutor supervises the search for knowledge of a student at a university.

Another argument—that in changing from private practitioners to State servants we might be jumping from the frying-pan into the fire—carries some weight. But the lot of younger practitioners who have to pay heavy tribute to banks and insurance companies and heavy taxes and heavy repayments of capital borrowed to buy practices must incline many to believe that they could at least be no worse off under a State medical service, and that their patients would benefit from a change that would relieve them from the necessity of providing profit for parasitic financiers.

I must confess that at present I regard the relationships between doctors and patients as as well arranged as international relationships. So I should be grateful if any of your readers could relieve me of the impression that I live and work among revolting chaos that requires revolutionary rearrangement.—I am, etc.,

Llanbradach, Glam., Feb. 27. WILLOUGHBY CLARK.

Fifty-one Years on Thyroid

SIR,—My interest in the annotation on long survival of a case of myxoedema on thyroid (*Journal*, March 2, p. 355) was excited because in my practice there is a lady who was 91 in December last and who has been taking 5 grains of thyroid daily ever since she was 40 years of age.

Fifty-one years ago she consulted my late father (Dr. J. Corbet Fletcher) for lassitude and general debility and was advised by him to take a thyroid tablet daily. She has enjoyed excellent health down the years, has had very little illness, and even to-day looks like a woman of 60 as she walks briskly along the street. In short, the thyroid would appear to have kept her mentally and physically fit throughout this long period.—I am, etc.,

London, N.W.3, March 6. N. CORBET FLETCHER.

"A Mirror for Surgeons"

SIR,—I am grateful to your reviewer for his all too flattering notice of *A Mirror for Surgeons* in the current issue of the *Journal*. The numerous minor errors of which he speaks are due to the war censorship, which prevented the sending of proofs for correction. The publishers have a list of corrigenda which I hope they will print and issue in due course.—I am, etc.,

London, W.1, March 9. D'ARCY POWER.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

A. H. M. Siddons of Jesus College has been examined and approved for the degree of M.Chir. The titles of the degrees of M.B., B.Chir. have been conferred on K. M. Cossens of Girton College.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS

At a meeting of the Royal Faculty of Physicians and Surgeons of Glasgow, held on March 4, with Mr. Roy F. Young, Visitor, in the chair, Andrew Rennie Hunter, M.B., Ch.B., was admitted a Fellow of Faculty.

The Services

HONORARY SURGEON TO THE KING

Major-General F. Casement, D.S.O., late R.A.M.C., has been appointed Honorary Surgeon to the King, vice Major-General H. Marrian Perry, C.B., O.B.E., late R.A.M.C.

DEATHS IN THE SERVICES

Surgeon Captain EDWARD COOPER, R.N. (ret.), died at Guildford on February 20. He was educated at Charing Cross Hospital and took the M.R.C.S., L.R.C.P. in 1888. After serving as senior house-surgeon at the Royal Portsmouth Hospital he entered the Royal Navy, became surgeon commander on November 11, 1906, and retired, with an honorary step as surgeon captain, on January 1, 1920. He served in the war of 1914–18, receiving the medals.

Obituary

SIR NASARVANJI CHOKSY, C.I.E.

Member of the Council of State of India

An outstanding figure in the public health of India has recently passed away by the death of the Hon. Khan Bahadur Sir Nasarvanji H. Choksy of Bombay, who was for more than thirty years in charge of the hospitals for plague and infectious diseases of the Bombay municipality. It is stated that during his period of service he had to deal with twenty-six epidemics of plague, sixteen severe epidemics of small-pox, thirteen of relapsing fever, and six of cholera. On three occasions he himself contracted bubonic plague, slightly in 1897 and 1903 and more seriously in 1904, when he owed his recovery to the timely application of serum from the Pasteur Institute, the only serum then available. It was said of him that he was never absent from his post of duty during a single epidemic season from 1888 until his retirement in 1921. He was a man of exceptional intellect and courage, and a great public servant.

The future Sir Nasarvanji Choksy was born in 1861 and was educated at Elphinstone High School and Grant Medical College of Bombay University. For a time he served in his college as assistant in anatomy, materia medica, and botany. In 1888 he was appointed medical officer to a small-pox hospital in the municipal service of Bombay; in 1890 he became medical superintendent of the Matunga leper asylum, and to this responsibility was added a little later the medical superintendency of the Arthur Road Hospital. The first epidemic of bubonic plague with which he was called upon to deal was in 1896. As though the ordinary stress of such an epidemic was not enough, with the exodus from the city of a large part of the population and the difficulty of obtaining staff and material for the patients he had to face risk of life and limb owing to the ignorance and panic of the people who remained. These people were unable to understand why so many died after removal to the hospital, and ascribed it to the injections which Dr. Choksy and his assistants were giving, or even in some odd way to the wrath of Queen Victoria, whose statue in Bombay had recently been defaced. The hospital had to be placed under the constant protection of troops and armed police, Dr. Choksy and his colleagues were escorted to and fro by soldiers, and for years afterwards the less intelligent of the population would make a long detour to avoid Arthur Road.

Dr. Choksy's handling of this and succeeding epidemics, however, gave him a great international reputation, and medical and administrative experts from many countries came to study the control of plague in Bombay. One tribute by the well-known journalist and war correspondent, the late G. W. Steevens, may be put on record. In his book on India, amid much dismal narrative, he wrote of this "Parsee physician . . . who knows his duty and does it." Although his pioneer efforts to introduce protective inoculation aroused antagonism in some quarters, Dr. Choksy earned high praise from Government administrators and was increasingly trusted by them. In 1902 he was given the additional charge of the Maratha Plague Hospital, Byculla, which he retained until his retirement. Other activities with which he was closely associated were the King George V Anti-tuberculosis League, of which he was honorary joint secretary from 1912 to 1920, and the governing body of the Bombay Presidency Branch of the British Empire Leprosy Relief Association (under his administration thirty-seven leprosy clinics were opened). He was a member of the Council of the College of Physicians and Surgeons of Bombay and of the Bombay Medical Union, and of both bodies he had been president. After his retirement in 1921 he was made a member of a sanitary committee concerned with a reclamation scheme which is considered to have enabled Bombay to escape the ravages of malaria, and he was also the right-hand man on a medical relief committee appointed by Sir Leslie Wilson, then Governor of Bombay, with a view to setting up a hospital scheme having regard to the needs of the population.

He received many honours in the course of his career. Scientific societies in European capitals and in America bestowed on him their honorary fellowships. He was the first Indian to receive the M.D. (*honoris causa*) of the University of Freiburg. The President of the French Republic, on the recommendation of the Academy of Medicine, awarded him in 1906 the "Médaille des Epidémies,' and King Humbert made him Chevalier of the Crown of Italy. At Queen Victoria's Diamond Jubilee he had been given the title of Khan Bahadur, a title which the British Government confers on distinguished Parsees and Mohammedans; in 1922 he was made a Companion of the Order of the Indian Empire; in 1929 he received a knighthood; and in 1932, on the nomination of the Viceroy, he became a member of the Council of State.

Of his four sons two are doctors, one in general practice as a physician and the other an assistant health officer of the Bombay Corporation. Sir Nasarvanji Choksy was elected a member of the British Medical Association in 1898, his membership covering a period of forty-two years.

By the death of FRANK RICHARD LATHBURY at Chipperfield, in his eighty-second year, the profession loses a man of outstanding character and personality. Coming from Midland stock, born at Burton-on-Trent, he was originally intended for the career of a printer, a calling for which he had no taste. He had a great desire to take up medicine, and owing to financial difficulties he entered the London Hospital at a later age than usual. He worked under the late Sir Frederick Treves, T. H. Openshaw, F. J. Smith, and their contemporaries, and often studied under adverse conditions, being married with a family when he was a student. Early qualification was essential, and in 1890 he took the L.S.A., and started practice in Brixton the next day. Life there was not to his liking and he took a country practice at Sarratt, Herts, and was a member of the B.M.A. for many years. Country practice in those days was hard, and at one time he kept five horses. He wore the top hat and frock coat customary in those days until the advent of the motor car, at which period he gave up general work. Dr. Lathbury (writes a correspondent) was never anything but a family doctor, a type rapidly disappearing. He disliked the panel system and would have nothing to do with it. As a country doctor he entered fully into the life, combining a little farming, hunting, and shooting with his medical work. He was a keen fisherman (almost a purist) of the dry fly type, and was a very skilful exponent of the art, tying his own flies, and could generally manage to creel a fish where others failed. Gardening perhaps was his main hobby. He was a great believer in hobbies, and he considered them essential for a medical man. Their pursuit gave him a wide knowledge which was of great value. Although not overburdened with medical degrees, he had other qualifications not obtainable at the examination table. Of a retiring disposition, and disliking publicity, he was gifted with a charming and sympathetic manner; he had a dynamic personality, and some of his character was hidden under a mantle of reserve and self-effacement; his presence in the sick-room inspired confidence and trust, and he had remarkable insight into human and animal nature. He was a sound judge of a horse and a motor car, as well as many other things. He had a peculiar acuteness of hearing even to the end, and could hear sounds inaudible to other people. He was loved and esteemed by most with whom he came in contact. A man of untiring energy, both physical and mental, he retained his working faculties to the end, and died full of years and honour, deeply mourned by his widow, two sons and a wide circle of true friends. So passes one who is a loss to the profession; but his work was done, and most of that work was for others. He stands as another example of medical men who start their career under difficulties and with a dark horizon, and who win through.

News has been received of the death of Dr. WILLIAM JOSHUA COWAN, of Worsley, Lancs. A native of Belfast, where he went to school, Dr. Cowan studied medicine at the Victoria University of Manchester and qualified in 1906 as M.R.C.S. and L.R.C.P. During the last war he held a commission as Captain in the R.A.M.C. and served in Gallipoli and Egypt and on hospital ships. He practised in Worsley from 1919, holding the appointments of district medical officer, public vaccinator, and police surgeon, and was also surgeon to the Ellesmere Corps of the St. John Ambulance Brigade. Dr. Cowan devoted himself to his practice, although his health was never good, and since a serious operation in 1938 he was a very sick man. He insisted, however, on carrying on until he contracted influenza while actively at work, and collapsed and died on February 24. He had been a member of the British Medical Association for the past twenty years, and belonged also to the Medical and Pathological Societies of Manchester.

The obituary notice of Dr. A. G. WELLS published on March 2 (p. 370) said that he had been vice-president of the West London Medico-Chirurgical Society. He was also president of the society during the session 1922–3.

Medical Notes in Parliament

In the House of Commons this week the Army Estimates were introduced and discussed. Civil Estimates were tabled for Services, including Broadmoor Asylum and the War Services of the Ministry of Health, among which were measures to deal with casualties and disease.

Health of the Air Force

Sir KINGSLEY WOOD presented the Air Estimates on March 7.

Commander LOCKER-LAMPSON moved that the House, while gratified at the satisfactory health and comfort of the Royal Air Force personnel at home and over-seas, recognized that the maintenance of a high standard of general fitness depended on the continuance of effective medical services, which must be encouraged and extended. He said that the "unhealth" of the German people lost Germany the last war. The Germans calculated food values exclusively in terms of calories and refused to believe in certain subtle substances which English professors were discovering; they refused to study diet in relation to disease. During and after the last war the Germans suffered from oedema of the legs and also from corneal ulceration because they lacked vitamin A. Recently the Royal Society compiled a register of 1,200 scientists available for work in this war, but those services were being sparingly used by the Government. He invited Sir Kingsley Wood to appoint a body of outside scientists if only to study the diet of the troops. Few were aware of the complexity of the medical side of the Air Force. The Air Force suffered from illnesses unknown to the other Forces. Seasoned pilots dived at 550 miles per hour. Doctors were waiting to plug these heroes' ears and bind their limbs to avoid the pull of the earth. Airmen suffered from night blindness due to the loss of visual purple in the retina, and this pigment could not be built up in the absence of vitamin A. Another illness common among airmen was fatigue at high altitudes, and this again was overcome if the pilots were properly fed and got oxygen. The Government ought to try to give airmen more of what they needed. The most essential food was milk. English milk was a food by itself and contained six vitamins. Their watchword should be "March upon milk" and their motto "Vitamins for victory."

Sir MURRAY SUETER asked whether the Air Force had enough physical training officers and inspectors. As the war went on some of the airmen would suffer from stress as they did in the last war. How were they going to prevent these young lads from getting over-stressed? In the last war the Naval Air Service had at Eastchurch a very fine doctor, who, when he saw a pilot showing signs of distress, recommended that he should go on leave. This kind of prevention could save a large number of pilots from having to be invalided out of the Service at a young age and pensioned. The Air Ministry ought to secure a number of young doctors and have them trained by men who understood this prevention. These young doctors should mix with the flying officers, and when they saw signs of distress they should send the man on leave or get his station altered and give him new surroundings. During the last war many pilots after crashing or being brought down by enemy action had neurosis or fell sick. Such pilots were often discarded and some did not get a fair deal. He asked the Air Ministry to set up an after-care health board with an independent chairman to look into these cases.

Captain ELLISTON said medical women were disappointed that they had been given little share of the work of the Air Force Medical Services, especially the "W.A.A.F." In the last war medical women were mainly responsible for the health and well-being of the women in these auxiliary services. Women medical officers were especially fit to advise and look after young girls who were often billeted in any available accommodation. Further, a serior woman medical officer should have the supervision of all these auxiliary services.

TREATMENT OF VENEREAL DISEASE

In venereal disease, Captain Elliston continued, the Air Force had an uncommonly good record. The incidence was governed very much by civilian conditions surrounding camps and munition works. A typical example was seen in a town twelve to fifteen miles away from London which until recently had a small population. Now it was an important centre of 50,000 people. Provisions for the prevention and treatment of venereal disease in that area were wholly inadequate. The Minister of Health recently sent out a circular calling upon local authorities to provide adequate treatment and suggesting that where necessary they should establish travelling clinics to meet war conditions. But the Ministry offered no financial help to these local authorities. There was a general feeling among local authorities that a special grant should be made for that national work. The area to which he referred was under the administration of a great county council, but there were no clinics in the near vicinity; people in that area who wanted treatment had to go to the London hospitals because the Home Counties had a joint scheme with the London County Council for the provision of treatment. What protection was it for the population in that area, for the working girls in that area—4,000 of them—if they had to go fifteen miles to get treatment? In the last war 400,000 men were infected. Incidence had been greatly reduced, and was being reduced, almost entirely by education. The work of education required highly trained teachers able to illustrate their lectures with instructive films. But the Ministry regretted that they could not make any financial contribution towards this work, although they suggested that local authorities should use the services of the British Social Hygiene Council. The Air Force should make use of these trained teachers and should show their films in the aerodromes and training establishments.

IMPORTANCE OF PHYSICAL TRAINING AND RECREATION

Mr. WAKEFIELD said the black-out was affecting the health of the Air Force personnel. During the past winter the living-rooms and sleeping-rooms of the Air Force had been blacked out for fourteen or fifteen hours daily and no fresh air had been allowed to enter. He hoped the Ministry would devise proper means of ventilation for these rooms before next winter. Since the outbreak of war many of the recreation grounds of the Force had been covered by hutments. Opportunities for games which existed in peace-time were no longer available. "Physical jerks" at 6.30 a.m. should be avoided; physical training and games should be at reasonable hours. The National Fitness Council had devised agility tests which were admirably suited for the Royal Air Force and could be carried out in small club-rooms or in small yards. Mr. GARRO JONES suggested the organization of sick bays without special medical treatment to provide for the isolation of persons suffering from respiratory diseases in their minor forms. The important factor in prevention was early isola-

tion of the infected person, but frequently a man with a cold or influenza was hardly able to report sick and remain in his billet or even in his tent, and within a week or two an epidemic ravaged the whole unit.

Sir ERNEST GRAHAM-LITTLE said there was a regrettable shortage of medical officers. Skilled observation of early symptoms could not be undertaken unless there was adequate medical personnel. This was not the fault of the Air Ministry. The R.A.M.C. was some 1,000 short. Recently there was an epidemic of influenza at one station. A young sergeant had a severe attack and was told by the Air Force medical officer to go to bed in his own dormitory, which he shared with other men. That man had a temperature of 103° for two nights, but was seen by nobody, had no nursing, and was served with food by his own friends. The only instructions from the medical officer were that the man should go to bed and report again two days later. The medical officer was not to blame, because he was overworked, but everything should be done to prevent repetition of that kind of thing.

GOVERNMENT REVIEW

Captain BALFOUR, replying for the Air Ministry, said that every progressive step in medicine or surgery during recent years had been applied to the Royal Air Force Medical Service. That Service was concerned with the selection of new entrants, and with the maintenance of the physical and mental fitness of all the personnel both on the ground and in the air. This work must cover medicine, surgery, diet, and accommodation. Since the war the Royal Air Force had included within its ranks many distinguished members of the medical and surgical professions, and had also increased the dental and nursing branches of the Service. It was employing a number of women doctors to look after the W.A.A.F. and also employed women as sick-quarter attendants and in dental surgery. The standard for flying personnel was no lower medically than it was in peace-time. The Flying Personnel Research Committee, of which Sir Edward Mellanby was chairman, dealt with research into the medical aspects of all matters conducing to safety and efficiency in flying. There was physiological research on the working of the human body and psychological research on how the mind would react when faced with certain problems. The pilot of a modern fighter aircraft had to look after forty-two instruments when the machine might be travelling between 300 and 400 miles an hour.

Sir ERNEST GRAHAM-LITTLE asked whether any use was made of psychological tests.

Captain BALFOUR said that the committee included the Professor of Physiology at Cambridge University, the Professor of Psychology at Cambridge University, the Professor of Medicine at Oxford University, and other distinguished persons. The committee had worked on problems such as design of glasses to counteract glare, the prevention of deterioration of hearing and fatigue through noise, solution of problems connected with high altitude flying, how to administer oxygen and how to improve oxygen equipment. The hospital service of the Royal Air Force, at home and abroad, was complete and well equipped, but they were willing to adopt new methods and learn new lessons. They had a special system for diagnosis and for looking after the treatment of flying personnel who became fatigued or stale through the war. They employed many outside consultants. They gave special attention to preventive measures, such as hygiene, diet, housing, sports, and games, and thereby had considerably reduced loss of efficiency through sickness and fatigue. The Air Force incidence of cerebrospinal meningitis was no greater than could be expected in peace-time under favourable conditions. Recoveries had been five times better than was usual in the country before the introduction of the new drug which aimed at curing this disease. Stocks of this drug were laid in at the stations before the epidemic started, and arrangements made for laboratory diagnoses to provide the earliest treatment for those suspected of suffering from this disease. They had recently appointed at the Air Ministry a director of hygiene with representatives of the various Commands to watch hygiene, sanitation, and diet. The standard of cooking and food in the Royal Air Force was one of which we could all be satisfied, and they were determined to retain it. They gave all men in the Air Force a diet containing approximately 4,000 calories a day, which was necessary for a man doing heavy work. So far as vitamins were concerned, attention was paid to butter, margarine, green vegetables, liver, and kidneys. All boys and aircraft apprentices received half a pint of fresh milk daily, and in this country the aim was that all units should buy fresh supplies of milk locally, provided it could be passed fit by the medical officer. Abroad, with the dangers of contaminated supply, the problem was different. Since the war they had increased their physical training organization and had a specialized P.T. course and syllabus.

The estimates for men and money required by the Air Force in the year ended March, 1941, passed through committee.

School Medical Services in Wartime

Mr. KENNETH LINDSAY, speaking on the Education Estimates in the House of Commons on March 5, said that the dispersal of 750,000 children to the country had given hope of a radical change in the physique and outlook of urban children. One interesting medical fact arose from evacuation. The incidence of infectious diseases had been remarkably low; diphtheria and scarlet fever were much less than in the corresponding period in 1938, and the position concerning infantile paralysis, which had appeared threatening in July, was even more satisfactory. This seemed due partly to the splendid autumn, partly to the closure of schools in the great cities, and partly to the double-shift method of schooling which most reception areas had to employ, and which, in spite of educational disadvantages, enabled all the children to have more open air than usual. The town children became acclimatized, and the native children acquired some immunity by small and gradual dosage to any fresh infective strains their new schoolmates might bring with them. Even some of the "drift-back," undesirable as it was, had some health advantages. It relieved overcrowding and left in the reception areas children most suitable and adaptable for country life. Recently, in Devon and Somerset, the evacuated children had shown a striking immunity to colds and influenza compared with local children. But he must leave this puzzle to medical research.

We had discovered within six months of evacuation that the minds, the manners, the outlook, and the physique of the children had changed. He could not produce complete statistical proof, though it was hoped to conduct a careful investigation, but testimony of inspectors was unanimous on this matter. Nor would it be possible to give statistical evidence of brighter eyes and better pigmentation. Regular meals, wholesome food, long hours of quiet sleep, fresh air, contact with the rhythms of Nature, which a child could only receive in the countryside, were contributory factors.

MEDICAL CRITICISM

Dr. HADEN GUEST said that they knew, from the report of the medical officer of the Board of Education, that about 10 per cent. of the children of the country, taking the country as a whole, were on a standard of nutrition that was below normal. The figure in the latest report available was 11.3 per cent. The most economical and wisest course would be to supply in every school midday meals for the children, which would secure that in any case they received adequate food. In present conditions it was not possible to supply about two pints of milk, which, theoretically, each child should have every day, but it might be possible for each child to have one pint a day. He hoped medical inspection of school children would include medical treatment of the defects found, and that it would extend to all areas of the country, including the reception areas. He had found medical inspection and treatment in reception areas in a very unsatisfactory state, owing to the fact that large numbers of the medical and nursing staffs were locked up in the evacuation areas and not doing any particular work.

Sir FRANCIS FREMANTLE said they must always keep in mind their ideas of what the school medical services should be. The

service started in 1908, and it was a question then simply of a rapid survey and a recording of results. It was foreseen that it would lead to the necessity for treatment of school children and from that to advances on other lines to a much larger and more comprehensive scheme. That result was coming, but had been a good deal delayed by the war. He hoped it would not be delayed in the long run. Referring to nursery schools and the effect of evacuation on the children in the country, he said there had been a remarkable improvement in the health of the children generally, but they could not in the future be billeted as they were now. There would have to be a great extension of school buildings in the form of camps and so on, and probably more permanent buildings. Asking if it was right and natural that children should be separated from their parents, he said he believed, on the whole, that it was an advantage.

GOVERNMENT REPLY

Mr. LINDSAY, replying to the discussion, said it was not true that the whole of the medical services and the provision of school meals had been discontinued, as some newspapers and some speeches would seem to indicate. The position was that they had to build the medical service round an institution, the school, unless they changed the whole form of it. If the school was not being used and it was not possible for the children to attend or some did not turn up, and if the medical officer did not turn up—that was not true except in reception areas to which London children went—the medical services could not function. The difficulty was that they had to get a medical defence in London and also to get doctors for the reception areas. Now the whole of the routine medical examinations were going on, and in fifty out of 150 areas there had been acceptance of the system of communal meals. At the moment the consumption of milk was about two-thirds of what it was last year, and that figure was rapidly improving. The reason why it was only two-thirds was the difficulty of the transfer of money from evacuation to reception areas. The system of the supply of milk did temporarily break down, but he did not think it was too bad, considering the circumstances, that two-thirds of the quantity drunk at this time last year was still being consumed.

Medical News

Professor James Chadwick, F.R.S., will deliver the tenth Joule Memorial Lecture before the Manchester Literary and Philosophical Society on Tuesday next, March 19, at 5.30 p.m., at 36, George Street, Manchester. His subject is "New Applications of Physics to Medicine."

A meeting of public health officers and members of local authorities and others, arranged by the Royal Sanitary Institute in co-operation with the Welsh Branch of the Society of Medical Officers of Health and the North Wales centre of the Sanitary Inspectors' Association, will be held at Colwyn Bay Town Hall on Saturday, March 30, at 2.30 p.m., when discussions will take place on "Bovine Contagious Abortion in Relation to Public Health" and on "Water Inspection."

The B.B.C. announces that there will be a repeat performance on Monday, March 18, at 10.15 p.m., of "Joseph Lister, Surgeon," which was first produced more than a year ago. The B.B.C. will also broadcast a feature programme about the history, growth, and development of the Red Cross on Good Friday, March 22, at 10.30 p.m. The international character of the movement will be emphasized, and the programme will include an account of the British Red Cross Society and its activities up to date.

The out-patient department of the National Heart Hospital (Westmoreland Street, W.) is now open on Monday, Tuesday, and Wednesday mornings only. New patients should be sent to arrive not later than 9.30 a.m.

We are informed that each of the three radiological societies—the British Institute of Radiology, the Radiological Section of the Royal Society of Medicine, and the Faculty of Radiologists—has taken part in making the arrangements for the radiological meetings on March 15 and 16 which were announced in this column in the *Journal* of March 9 (p. 422), and not the British Institute of Radiology alone, as stated.

At the first annual meeting of the Association of London Special Hospitals, held on March 6, the preliminary work of this body in protecting and promoting the interests of special hospitals was reviewed. Recognizing the important developments which must ensue from the Nuffield Trust for hospital regionalization outside the metropolitan area, it was decided to widen the activities of the association to cover the whole country and to admit special hospitals in the Provinces to membership.

The annual general meeting of the Central Council for the Care of Cripples will be held at Carnegie House, 117, Piccadilly, W., on Tuesday, March 19, at 2.30 p.m. Dame Georgiana Buller will give an address at 3.30 p.m. on training and rehabilitation of cripples, with special reference to war casualties.

A course of twelve free lectures on "Geology and Early Man" will be given by Mr. T. T. Paterson in the Linnean Society's Rooms, Burlington House, Piccadilly, W., on Fridays and Mondays, at 3 p.m., from March 29 to May 10, excepting Friday, April 19.

Surgical, medico-chirurgical, and dental academies were opened in Madrid last November.

EPIDEMIOLOGICAL NOTES

Epidemiological Table.—Table No. 37, which would in normal times have appeared in the *Journal* of September 30, 1939, had to be published a week later because of unavoidable delay incidental to the war. All subsequent tables have similarly been a week in arrears. It is, however, now possible to revert to the original arrangement whereby the table is printed thirteen days after the end of the week to which it relates, and to close the gap we include both No. 7 and No. 8 in this issue.

Cerebrospinal Fever.—The latest return shows increases in all the important notifiable diseases as compared with the preceding week, but the rate of increase of cerebrospinal fever has slowed down for the first time since the disease began to acquire epidemic character at the beginning of the year. It now prevails in fifty (forty-eight in the preceding two weeks) of the sixty-one administrative areas in England and Wales. Increases were recorded in the following: Bedford 4 (2), Cumberland 9 (4), Derby 20 (11), Essex 18 (11), Gloucester 25 (21), Lancaster 47 (36), Middlesex 24 (9), Nottingham 5 (3), Southampton 48 (43), Stafford 14 (13), Sussex West 5 (4), Wilts 20 (14), Yorks East Riding 7 (3), Yorks West Riding 22 (14), Flint 9 (2), Monmouth 20 (19); decreases in: Berks 14 (16), Bucks 3 (5), Chester 10 (17), Dorset 8 (12), Durham 8 (9), Kent 24 (25), Lincoln, parts of Kesteven 0 (5), Lincoln, parts of Lindsey 7 (11), London 27 (28), Norfolk 6 (14), Northampton 2 (6), Northumberland 7 (8), Oxford 4 (7), Somerset 19 (27), Warwick 13 (24), Worcester 5 (11), Denbigh 6 (8), Glamorgan 29 (32), Pembroke 8 (11); in three areas—Devon 13, Sussex East 5, Yorks North Riding 7—the same number was recorded in both weeks. Figures in parentheses relate to the earlier week. In Scotland the disease continues to spread; thirty-eight counties and burghs were involved, compared with twenty-nine in the earlier week. Increases were recorded in the counties of Ayr 4 (3), Dumfries 8 (2), Lanark 10 (6), Roxburgh 9 (5), and the burghs of Aberdeen 7 (6) and Dumfries and Maxwelltown 9 (5); there were decreases in the counties of Fife 0 (5), Midlothian 3 (4), Moray and Nairn 3 (4), and the burghs of Glasgow 18 (21) and Edinburgh 18 (22). In Dundee the same number, 6, was notified in both weeks. There were 10 (4) deaths from the disease in London, 4 (5) in Glasgow, and 3 (3) in Edinburgh.

No. 7

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended February 17, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for : (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for : (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases ; a blank space denotes disease not notifiable or no return available.

Disease	1940 (a)	1940 (b)	1940 (c)	1940 (d)	1940 (e)	1939 (Corresponding Week) (a)	1939 (Corresponding Week) (b)	1939 (Corresponding Week) (c)	1939 (Corresponding Week) (d)	1939 (Corresponding Week) (e)
Cerebrospinal fever	560	28	114	1	5	44	5	18	2	—
Deaths		4	10				1	—		
Diphtheria	655	28	209	55	34	1,212	98	207	54	28
Deaths	20	1	11	1	1	33	5	6	1	—
Dysentery	61	2	28		—	24	5	24		—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	14	—	1		—	1	—	1		—
Deaths		—	—				1	—		
Enteric (typhoid and paratyphoid) fever	13	2	2	5	4	20	—	4	5	2
Deaths	3	—	—	—	1	2	—	—	—	—
Erysipelas			48	5	5			79	7	4
Deaths		—	—				—	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	43	6	10	4	6	40	15	5	2	4
Measles*	4,055	46	55		316		29	49		2
Deaths	14	—	2	—	14	7	—	—	—	—
Ophthalmia neonatorum	72	10	18		—	76	9	34		1
Deaths										
Pneumonia, influenzal†	2,074	100	139	9	13	1,919	197	60	7	22
Deaths (from influenza)	521	47	86	11	15	255	37	35	6	5
Pneumonia, primary			492	15				288	12	
Deaths		96‡		23	40		30		18	10
Polio-encephalitis, acute	1	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	4	—	3		—	6	2	1		—
Deaths		—	—				—	—		
Puerperal fever		2	6	3	1	4	4	8	2	3
Deaths		1					1¶			
Puerperal pyrexia	153§	15	27		—	191	27	21		1
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,019	44	113	56	61	1,637	172	267	69	81
Deaths	6	—	1	—	—	1	—	—	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	509	12	36		13		264	516		34
Deaths	5	—	1	—	2	14	4	12	3	1
Deaths (0-1 year)	578	73	115	52	32	398	60	67	27	20
Infant mortality rate (per 1,000 live births)						61	50			
Deaths (excluding stillbirths)	8,807	1,299	1,186	298	314	5,953	1,225	678	207	161
Annual death rate (per 1,000 persons living)			22.7	19.9	27.6	14.6	15.6	13.7	13.9	14.3
Live births	6,226	893	917	279	247	6,440	1,084	837	387	226
Annual rate per 1,000 persons living			18.6	18.6	21.7	15.8	13.8	16.9	26.0	20.0
Stillbirths	258	31	35			244	28	32		
Rate per 1,000 total births (including stillborn)			37			37	25	37		

* Made notifiable generally on November 1, 1939.
† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.
¶ Death from puerperal sepsis.
‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia ; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.
§ Includes figures for puerperal fever.

No. 8

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended February 24, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for : (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for : (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases ; a blank space denotes disease not notifiable or no return available.

Disease	1940					1939 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	586	27	134	3	1	37	7	12		—
Deaths		10	9				2	2		
Diphtheria	734	30	192	64	23	1,171	125	208	55	25
Deaths	31	2	5	2	—	26	5	4	6	1
Dysentery	63	2	28		—	17	2	14		6
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	6	1	—	—	—	3	1	2	1	—
Deaths		—	2				1	—		
Enteric (typhoid and paratyphoid) fever	6	1	—	—	1	31	—	2	5	—
Deaths	—	—	—	—	—	1	—	—	—	1
Erysipelas			63	5	8			56	10	3
Deaths		—	—				1	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	31	4	7	4	7	39	7	7	7	2
Measles*	4,793	93	126		316		27	97		1
Deaths	8	—	—	—	16	4	—	—	2	—
Ophthalmia neonatorum	82	5	20		—	87	10	28		1
Deaths										
Pneumonia, influenzal†	2,280	110	109	10	14	1,616	178	40	7	17
Deaths (from influenza)	629	59	84	20	28	285	67	34	1	3
Pneumonia, primary			443	17				217	7	
Deaths‡		124		43	31				17	13
Polio-encephalitis, acute	—	—				4	—			
Deaths		—					—			
Poliomyelitis, acute	8	1	1		—	5	—	1		—
Deaths		—	—				—	—		
Puerperal fever		2	3	2	—	4	4	17	1	—
Deaths		—					2¶			
Puerperal pyrexia	154§	10	22		4	179	30	20		—
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,174	38	132	50	67	1,695	139	277	50	88
Deaths	4	—	—	—	1	3	1	2	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	521	13	18		7		254	515		38
Deaths	6	—	1	1	—	20	6	10	—	—
Deaths (0-1 year)	589	59	115	43	28	387	58	77	34	16
Infant mortality rate (per 1,000 live births)						59	48			
Deaths (excluding stillbirths)	9,494	1,427	1,085	364	324	6,073	1,299	740	196	160
Annual death rate (per 1,000 persons living)			20.7	24.3	28.4	14.9	16.5	15.0	13.2	14.2
Live births	6,595	1,027	912	345	244	6,062	972	883	322	226
Annual rate per 1,000 persons living			18.5	23.0	21.4	14.9	12.4	17.9	21.6	20.0
Stillbirths	305	37	49			246	54	34		
Rate per 1,000 total births (including stillborn)			51			39	53	37		

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

¶ Death from puerperal sepsis.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

§ Includes figures for puerperal fever.

Letters, Notes, and Answers

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QUERIES AND ANSWERS

Böhler's Lower Leg Splint in Wood

Mr. ERIC L. FARQUHARSON (Edinburgh) writes: I would thank Dr. B. A. Slocombe for the interest he has shown in this splint, an account of which was published in the *Journal* of March 2 (p. 350). The splint can be supplied by Archibald Young and Son, Ltd., Edinburgh, and by Down Bros., Ltd., London. For the treatment of war casualties it can also be obtained from the Scottish branch of the British Red Cross. As Dr. Slocombe suggests, the splint could be made by a local joiner if he had a model to copy. I feel that it is difficult to give measurements which would in themselves be adequate. The dimensions are essentially the same as those of the standard splint (in iron), except that the broad base and the upright hoop are omitted.

Sterilization of Liquid Paraffin

Mr. FRANK ALLEN writes: Dr. S. A. Montgomery is good enough to admit (March 2, p. 376) that the time/temperature figures I have quoted have a semblance of accuracy. But by his use of italics he implies that my contention that liquid paraffin is readily contaminated is unsound. I agree "that organisms *do not readily grow* in an oily medium." But I wonder why Dr. Montgomery (or his authority) should then infer "that therefore if the oil were contaminated . . . it is questionable if the bacteria would retain their viability over a long period." It does not follow necessarily. In most cases the reverse seems more likely. Indeed one may say the above passage embodies something of a popular misconception. *B. coli* and *B. pyocyaneus*, for example, persist in liquid paraffin for a month at least, according to Lichtenstein. So the time limit for sporing organisms is probably of the order of years. Regarding likelihood of contamination: that is a variable and indeterminate consideration. Thus the dregs of a forty-gallon barrel "on tap" in a packing room or yard are likely to be heavily infected. A small stock bottle initially sterile and stored in a surgery cupboard, even if opened and used from time to time, probably remains for its purpose fairly safe. But such safety is not enhanced by the continued currency of the fallacy that restriction of growth is necessarily germicidal.

Income Tax

Car Allowance

"G.P." asks how much can be claimed for car allowance for the past ten years.

*** In the first place it should be pointed out that expenses of general practice or appointment work should be claimed when the return is made, or at latest when a notice is received of the assessment which has been made. But if the overcharge has arisen—as presumably in this case—through omission to claim some particular item when sending in the return, an adjustment can be claimed under what is sometimes called "the errors and omissions section"—but the maximum period of claim is six years, not ten years. "G.P." should therefore send in to the inspector of taxes who dealt with his affairs a statement showing for each of the six years to December 31, 1939, what expenses, including 22 per cent. depreciation on the reducing value of the car, he claims to set against his professional receipts, and asking for the appropriate amount of tax to be refunded to him.

Assistant's Board and Lodging

"SIGMA" asks for advice as to the arguments to be put forward in resisting an assessment to include 25s. per week being the value of the lodging and part board paid for by his principal.

*** From the correspondence sent to us it would appear that the inspector of taxes who is dealing with the matter has overlooked a cardinal distinction between the facts and those in the case of Hartland *v.* Diggines to which he has referred. If "Sigma" had been personally liable for payment of the 25s. a week and his principal had "satisfied the liability of his employee towards his landlady," then that "satisfaction" would have been equivalent to payment of that amount of money to "Sigma" himself, and consequently income tax liability would have attached. But as "Sigma" was *not* legally liable to his landlady the common law rule as to equivalence to a cash payment of a discharge of that liability does not apply, and the case falls within the old rule laid down in Tenant *v.* Smith. We advise "Sigma" to appeal to the Commissioners—preferably the "Special Commissioners"—though it may be worth while first of all to put the facts before the Board of Inland Revenue, by letter to Somerset House, to know whether the inspector's attitude has their approval.

LETTERS, NOTES, ETC.

A Mishap with Carbon Dioxide

The South Hampshire coroner recently inquired into the death of two patients through a somewhat unusual accident. A sick-berth attendant and an able seaman were undergoing operations at the Royal Naval Hospital, Haslar, and both died on the table. The subsequent inquiry revealed that someone whose identity was never discovered had placed a cylinder of carbon dioxide in that place in the machine which should have been occupied by a cylinder of nitrous oxide. One of the anaesthetists said that in civilian hospitals carbon dioxide cylinders and fittings were painted green. He had ordered the cylinders in the Haslar hospital to be similarly marked since last June. The cylinder which had caused the deaths had once been green but had been painted over, and there was nothing to indicate that it contained carbon dioxide. No such accident had happened in the hospital before, although the machine was in almost daily use. The machine had been examined before the gas was administered to the two men and had appeared to be in proper order. After the second death it was examined again, and the cylinder valve was found to be marked "C.O." The cylinders were filled in Portsmouth Dockyard, and at the hospital were kept separate from each other and in their proper colours. The short newspaper accounts obtainable do not state the design of the machine, but the facts suggest that cylinders ought to be distinguished by some more permanent mark than paint—for instance, a device cast into their metal.

"Analecta Therapeutica"

We have received from Messrs. Parke, Davis and Co. (50, Beak Street, London, W.1) a copy of a volume entitled *Analecta Therapeutica*, which they are sending to members of the profession who are interested in their products. The volume describes a variety of preparations of special interest; for instance, sex hormones, hormones of the anterior pituitary gland, and a number of new synthetic compounds such as epanutin and mapharside. A clear and concise account is given of the properties and actions of these important preparations. The volume is profusely illustrated, and the coloured diagrams deserve special mention. These are used very effectively to explain certain complex problems of endocrinology, such as the actions of female sex hormones and the interrelation of the hormones of the gonads and the anterior pituitary gland. The volume will be of interest to writers of textbooks, since it demonstrates the surprising amount of information that can be conveyed by coloured diagrams and illustrations when the use of these is not limited by considerations of cost.